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# MINERAL AND FOSSIL FUEL PRODUCTION IN VIRGINIA (1999-2003)

Amy K. Gilmer, Catherine B. Enomoto, James A. Lovett, and David B. Spears

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF MINES, MINERALS AND ENERGY
DIVISION OF MINERAL RESOURCES
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FRONT COVER: Pump jack installation on coalbed methane well operated by CNX Gas Company, LLC, in Buchanan County. Photograph provided by the Division of Gas and Oil.

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# MINERAL AND FOSSIL FUEL PRODUCTION IN VIRGINIA (1999-2003)

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## INTRODUCTION

Virginia's geology provides a wide variety of mineral resources essential to our modern way of life. Over ninety percent of Virginia's counties produce some sort of mineral or fossil fuel commodity. For a map of Virginia's geology and counties, see Appendix II. The Commonwealth is fortunate to have the materials necessary to support our energy, manufacturing, agricultural, and transportation industries. This report presents reviews of mineral and fossil fuel production in Virginia for the years 1999 to 2003 and provides an overview of these industries in the Commonwealth, highlighting trends in production, value, and national ranking.

The word "mineral" in the title of this report is to be taken in its broadest sense. It is meant to include all of the non-fuel mineral commodities: clay, crushed stone, dimension stone, construction sand and gravel, gemstones, and industrial minerals. In Virginia, industrial mineral production includes kyanite, titanium (ilmenite), zirconium, vermiculite, feldspar, iron oxide pigments, lime, fuller's earth, salt, and industrial sand. This report also covers "fossil fuels", including coal, oil, and natural gas (both conventional gas and coalbed methane).

These industries are important to Virginia's economy. The annual combined total value of mineral and fossil fuel production in Virginia ranged from $1.77 billion in 1999 to $2.09 billion in 2003 (Figure 1). Of this, coal accounted for 46 percent of total production, aggregate (crushed stone, construction sand, and gravel) for 24 percent, natural gas and oil for 19 percent, and industrial minerals for 11 percent (Figure 2). Virginia's mineral industries are also nationally significant. In 2003, Virginia was ranked ninth in the nation for coal production, eighth for crushed stone, and tenth for lime. Virginia was the only state to produce kyanite and ranked second nationally in feldspar, ilmenite, zirconium, and vermiculite production. Additional detailed mineral-resource-production information for each of the years 1999 through 2003 can be found in Tables 1 through 5 in Appendix I.

The total direct and indirect economic gain, including wages, business income, and government revenue, was estimated to be more than seven times the value of production in 1998, the latest year for which an analysis is available (Leaming, 1999). Applying the same factor to the value of total production in 2003 yields a total economic gain of $15.2 billion. Total Virginia employment in fuel and non-fuel mineral extraction was about 13,200 in 2003.

## MINERAL RESOURCES

### Sand and Gravel

Sand and gravel are used as construction materials, primarily as aggregate in concrete, as road base, or as fill. In 2003, a total of 279 sand and gravel operations in 55 counties/cities throughout Virginia produced 14.5 million short tons of material at a value of $82.4 million (Figures 3 and 4). Sand and gravel production tonnage in Virginia ranked second in the nonfuel minerals industry after crushed stone. Sand and gravel are extracted from ancient alluvial fans, river terraces, and flood plains or dredged from the rivers themselves (Figures 5 and 6).

Market demand for construction sand and gravel is driven by the level of construction activity in an area. In Virginia, sand and gravel production decreased 38 percent from its peak in 1990, but remained fairly consistent from 1991 to 2003 (Figures 3 and 4). Sand and gravel operations must produce large quantities of

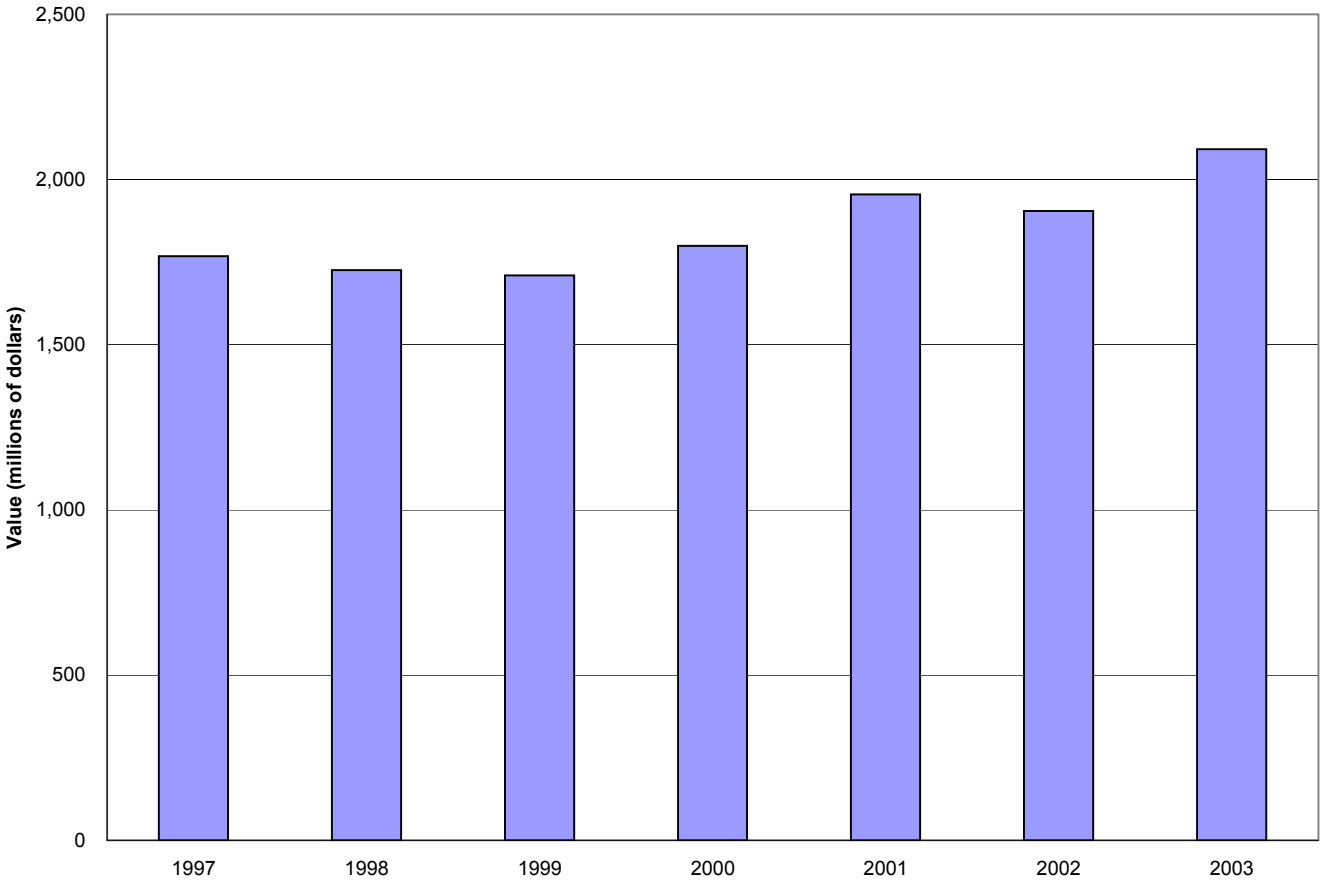


Figure 1. Total value of fuel and nonfuel mineral resource production in Virginia by year.

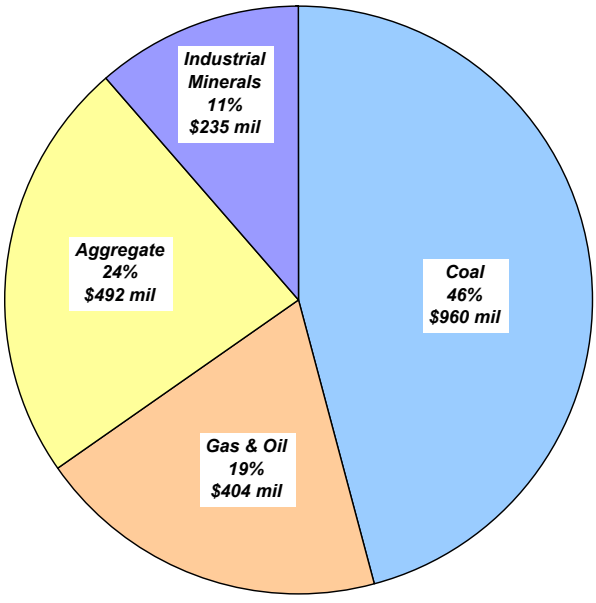


Figure 2. Relative contribution of Virginia's mineral and fossil fuel production sectors to the total value of mineral production for 2003.

material in order to be profitable because it is a relatively low-margin commodity. Transportation cost largely controls price, therefore most sand and gravel production involves local or regional markets near the point of use because it is not economic to transport the material great distances. Increasing competition from crushed stone operations, whose product can be substituted for sand and gravel, has also had an effect on demand for traditional sand and gravel products.

## Clay Materials

Clay and shale are mined in Virginia to produce structural clay products such as bricks, lightweight aggregate, cement, clay pipe, and sewer pipe. Approximately 1.4 million short tons of clay and shale were extracted in 2003 (Figure 7). Clay material extraction for brick making occurred in nine counties in western and central Virginia (Figures 8 and 9).

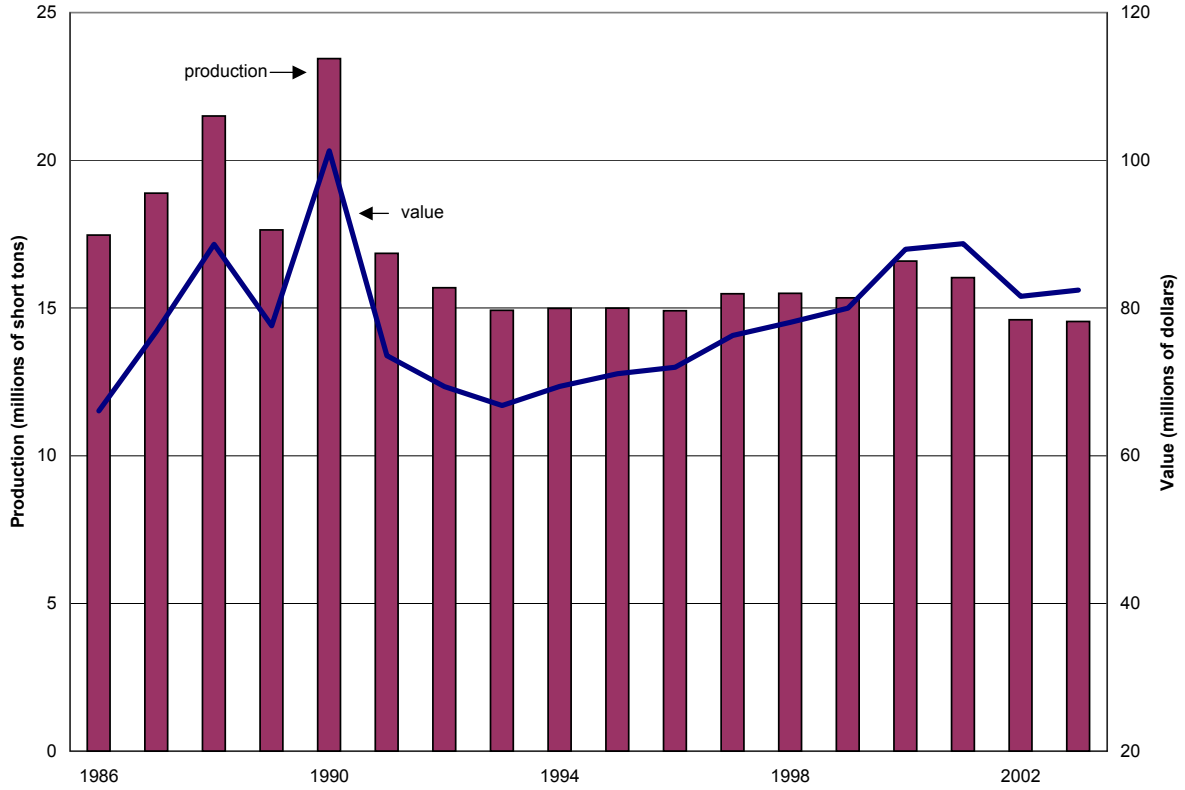


Figure 3. Sand and gravel production and value 1986-2003.

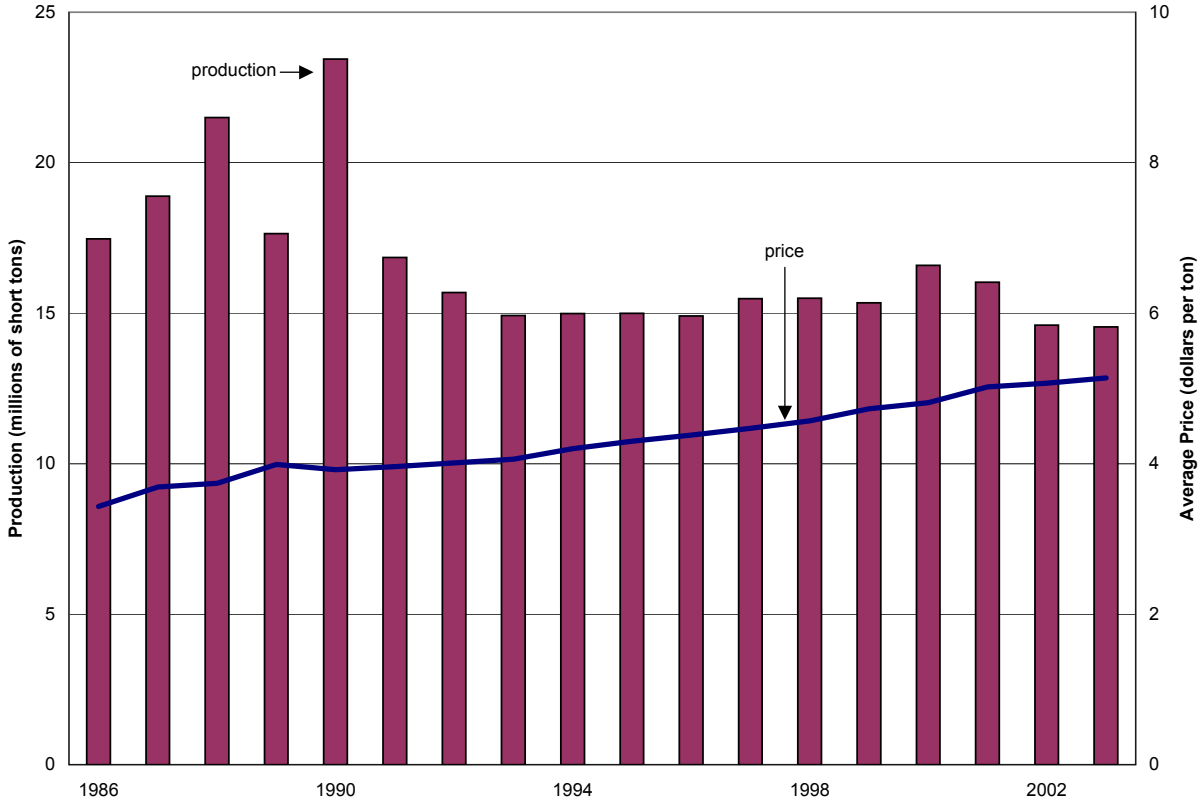


Figure 4. Sand and gravel production and price 1986-2003.

Figure 5. Sand and gravel mining operation in Augusta County (photograph by Stanley S. Johnson).

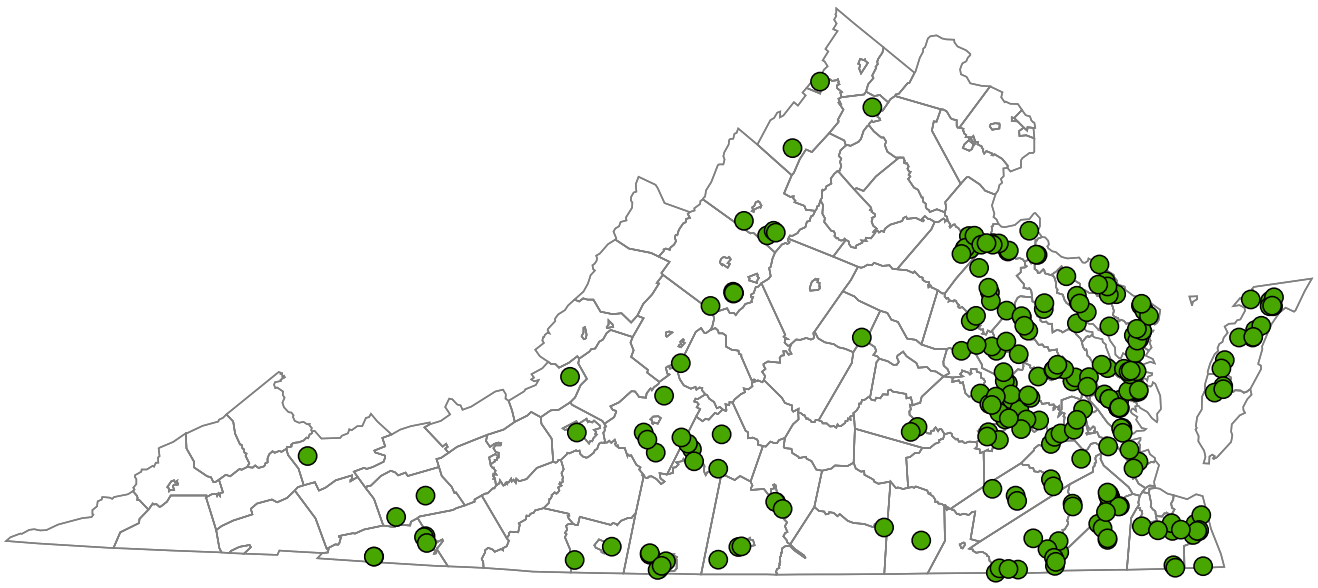

Figure 6. Sand and gravel extraction sites in Virginia with active permits during 1999-2003.

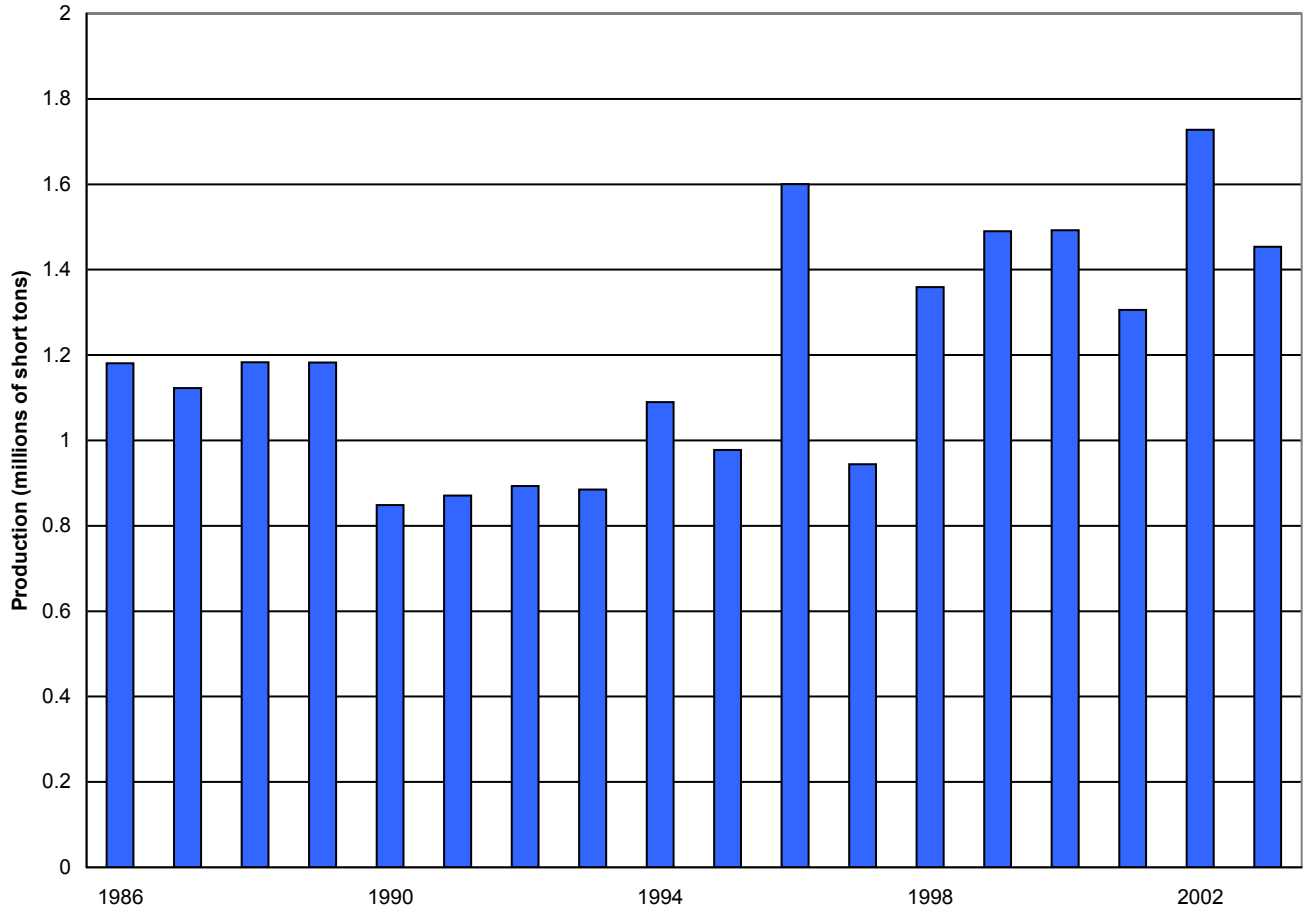


Figure 7. Clay material production in Virginia, 1986-2003.

In 2003, approximately 235 thousand short tons of slate and shale were produced by Solite Corporation for use as lightweight aggregate. Solite Corporation mines the Arvonia Slate in Buckingham County and mines shale from the Danville Triassic basin in Pittsylvania County. The raw material is heated to 2100º F at which point it expands. This lightweight aggregate is used primarily in masonry block and concrete for construction purposes.

Fuller's earth is another type of clay material produced in Virginia. Virginia ranked fourth in the United States in production of the montmorillonite variety of fuller's earth (Virta, 2003). In 2003, approximately 52 thousand short tons of fuller's earth were mined in Virginia. Currently, two operations produce fuller's earth. Bennett Mineral Company in Walkerton, King and Queen County, produces fuller's earth with a composition of 65-70 percent montmorillonite and 30-35 percent diatomaceous earth (Bennett Mineral Company, 2005). The fuller's earth produced at this operation is primarily used as cat litter but is also marketed as an oil absorbent floor sweep material and as an animal feed supplement. Nestlé Purina Petcare's operation in King William County also produces fuller's earth for use as cat litter. Market demand for fuller's earth is likely to remain constant as cat litter sales have been steady for the past few years (Virta, 2003). Extraction of the fuller's earth is by dragline. These deposits are in the Tertiary Calvert Formation.

Figure 8. Clay material in Orange County extracted for brick production (photograph by Stanley S. Johnson).

Figure 9. Bricks produced from clay mined in Orange County (photograph by Stanley S. Johnson).

## Crushed Stone

Crushed stone is an essential component necessary for today's construction industry. It is predominantly used as aggregate for road construction and maintenance where it is used for fill, roadbed material, and in concrete and asphalt for road surfaces. In Virginia, limestone, dolostone, sandstone, quartzite, granite, gneiss, basalt, greenstone, aplite, slate, and marble are all quarried for use as crushed stone (Figure 10). An unknown percentage of Virginia's limestone production is processed for making cement and lime (see "Lime" section below). Mine safety dust is also produced from limestone quarried in southwest Virginia (Figure 11). This dust is applied to the roof, walls and floor of coal mines to help prevent explosions.

In 2003, approximately 75 million short tons of crushed stone were produced at a value of $479 million (Figure 12), ranking Virginia tenth in United States crushed stone production (Tepordei, 2004). Crushed stone production and price remained fairly steady from 1999 to 2003 (Figure 13).

## Lime

Industrial lime is produced by the calcination of limestone or dolostone. Besides being a primary component of cement, lime is used in the manufacture of steel, paper, and chemicals, purification of water, and as a soil amendment in agriculture. It is also used to reduce sulfur and nitrogen emissions from coal-fired power plants. From 1999 to 2003, lime was produced in four counties. In Giles County, Chemical Lime Company mines limestone from the Ordovician Five Oaks Limestone (Figure 14). Chemstone Corporation quarries and calcines the Ordovician New Market Limestone in Frederick and Shenandoah Counties. The Riverton Corporation in Warren County quarries and calcines limestone from the Ordovician Edinburg Formation. Appomattox Lime Company, a division of Rockydale Quarries Corporation, produces agricultural lime in Appomattox County. From 1999 to 2003 production information was not reported separately from other limestone production; therefore, statewide lime production numbers are not available.

## Dimension Stone

Dimension stone is a traditional building material used in construction for structural or decorative uses. For hundreds of years, dimension stone was the main load bearing material used in the construction of major buildings and

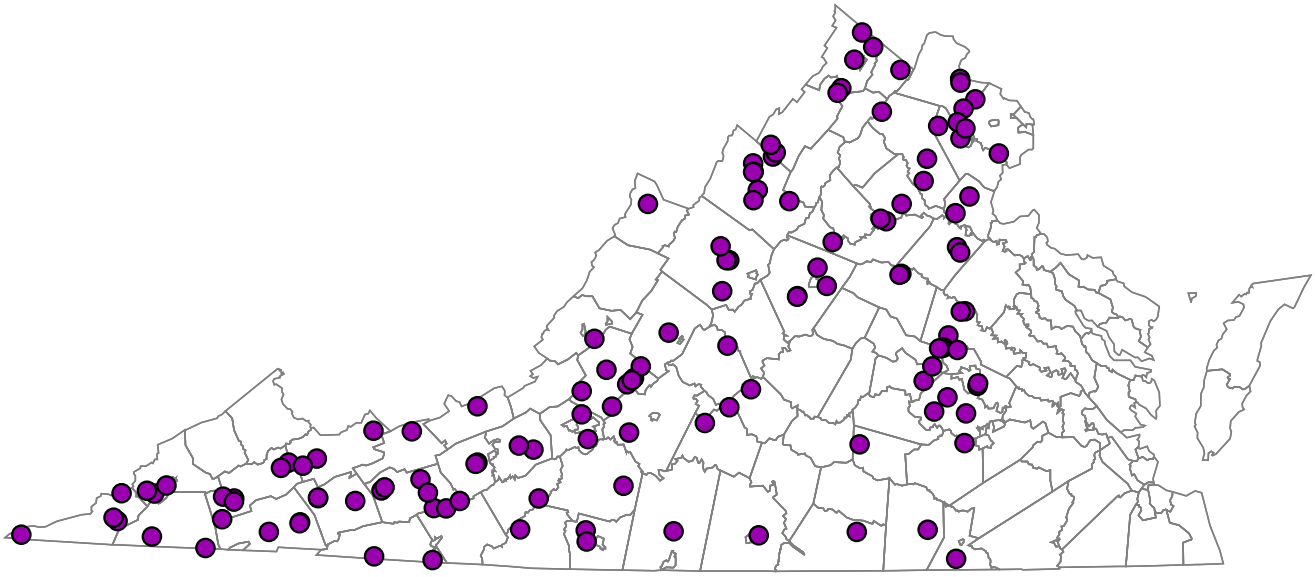

Figure 10. Map of crushed stone operations in Virginia with active permits during 1999-2003.

Figure 11. Limestone quarry in Russell County (photograph by Stanley S. Johnson).

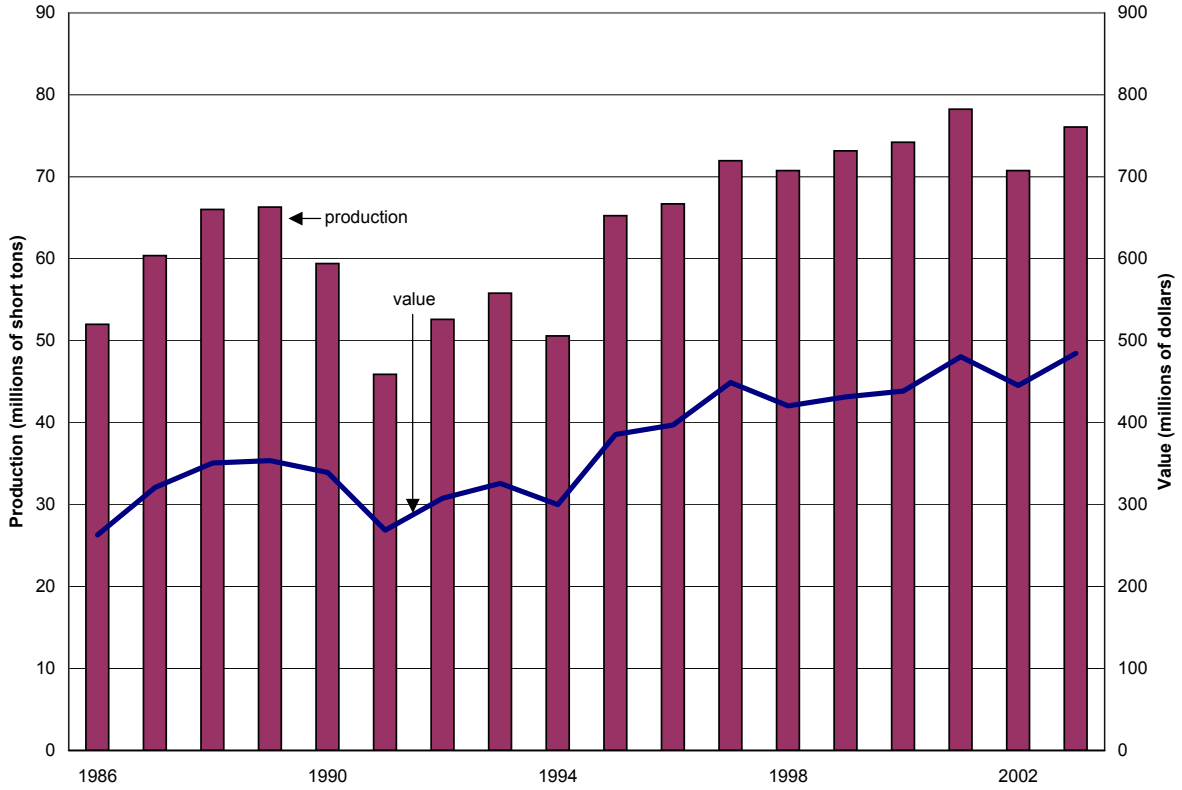


Figure 12. Crushed stone production and value 1986-2003.

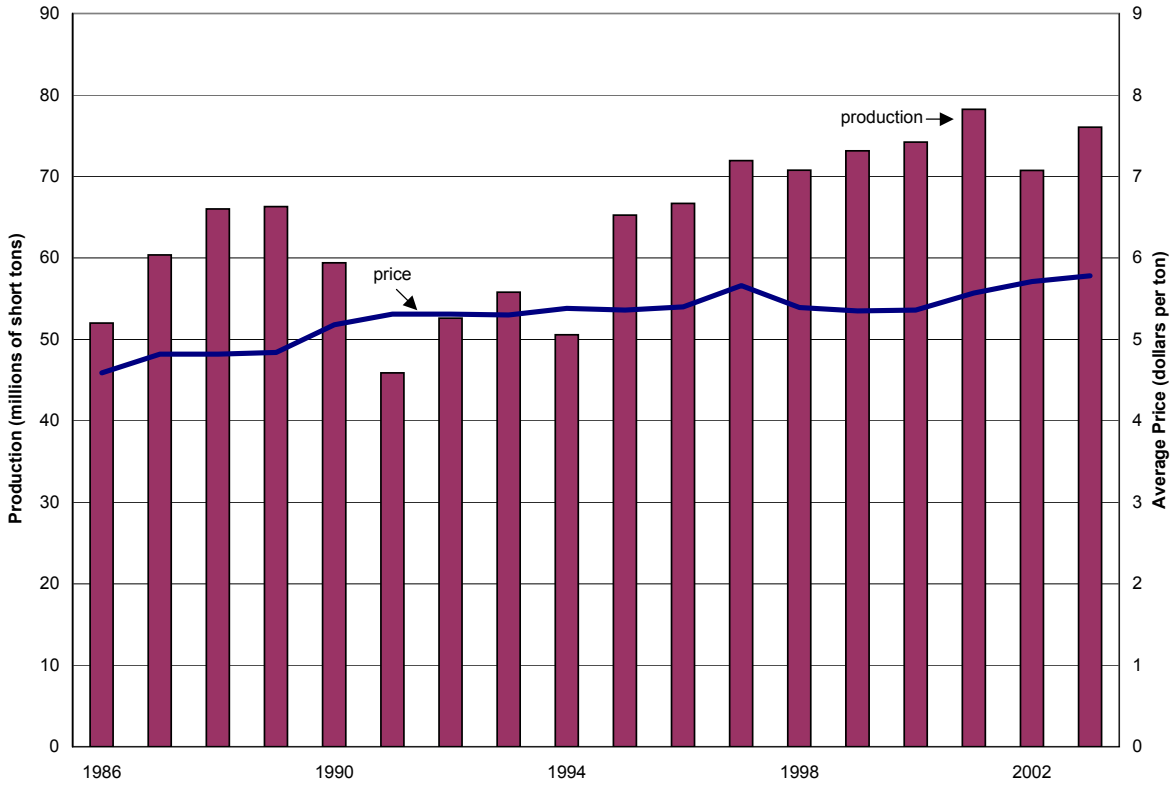


Figure 13. Crushed stone production and price 1986-2003.

Figure 14. Chemical Lime Company's underground limestone mine in Giles County (photograph by Stanley S. Johnson).

bridges. In today's construction, granite blocks, sandstone slabs and slate shingles have been largely replaced by steel, reinforced concrete and aluminum sheets. Dimension stone is now used primarily in a decorative rather than a structural role.

Many types of igneous, metamorphic, and sedimentary rocks can be quarried for dimension stone. From 1999 to 2003, slate, diabase, granite, dolomite, quartzite and soapstone were all quarried for use as dimension stone in Virginia (Figure 15). As a decorative material, properties such as color, texture, durability and surface finish are very important and determine dimension stone use. Dimension stone is quarried by the separation of large rough-cut blocks from the quarry face. Initial sizing and shaping are usually done at the quarry site before shipping. Further finishing and polishing may be done at the quarry site or at a separate finishing plant.

In 2003, approximately 1.4 million short tons of dimension stone were produced, a 9.5 percent increase in production compared with 2002 (Figure 16). Demand will likely remain strong for dimension stone in the future, as it is still highly sought after for its decorative uses in home improvement and interior design. Virginia ranked 19$^{th}$ in 2003 in dimension stone production in the United States (Dolley, 2003). Dimension stone production has increased dramatically since 1995 (Figure 16).

In terms of raw tonnage, diabase was the leading type of dimension stone produced in 2003. It is produced by New England Stone and Rockwell Granite in southern Culpeper County

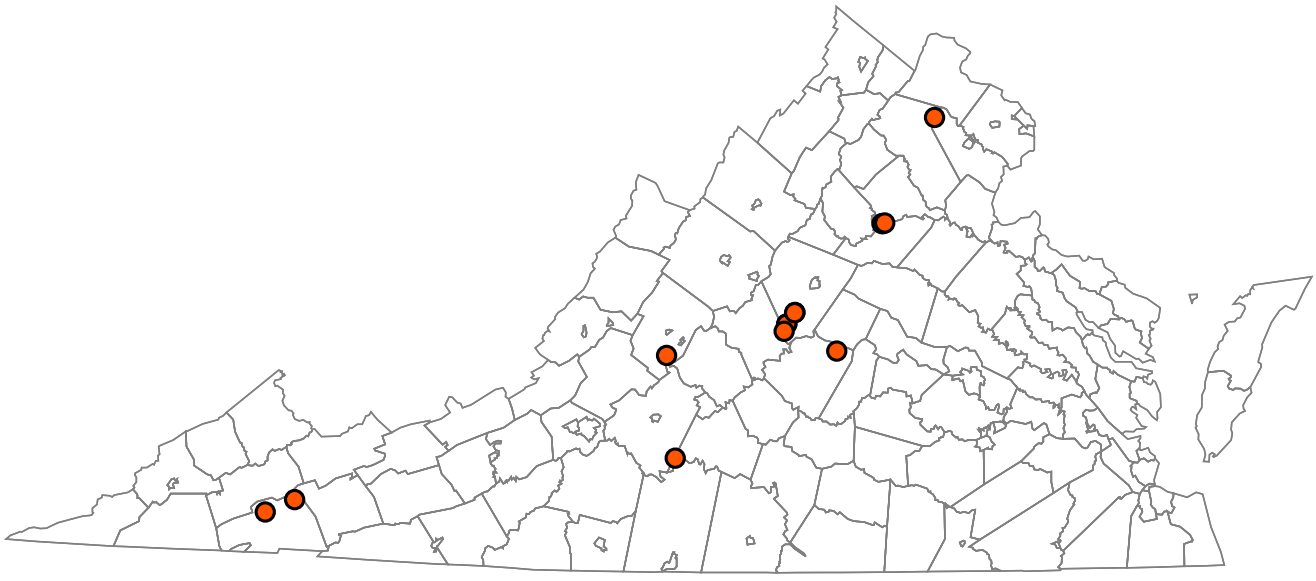

Figure 15. Map of dimension stone operations in Virginia with active permits during 1999-2003.

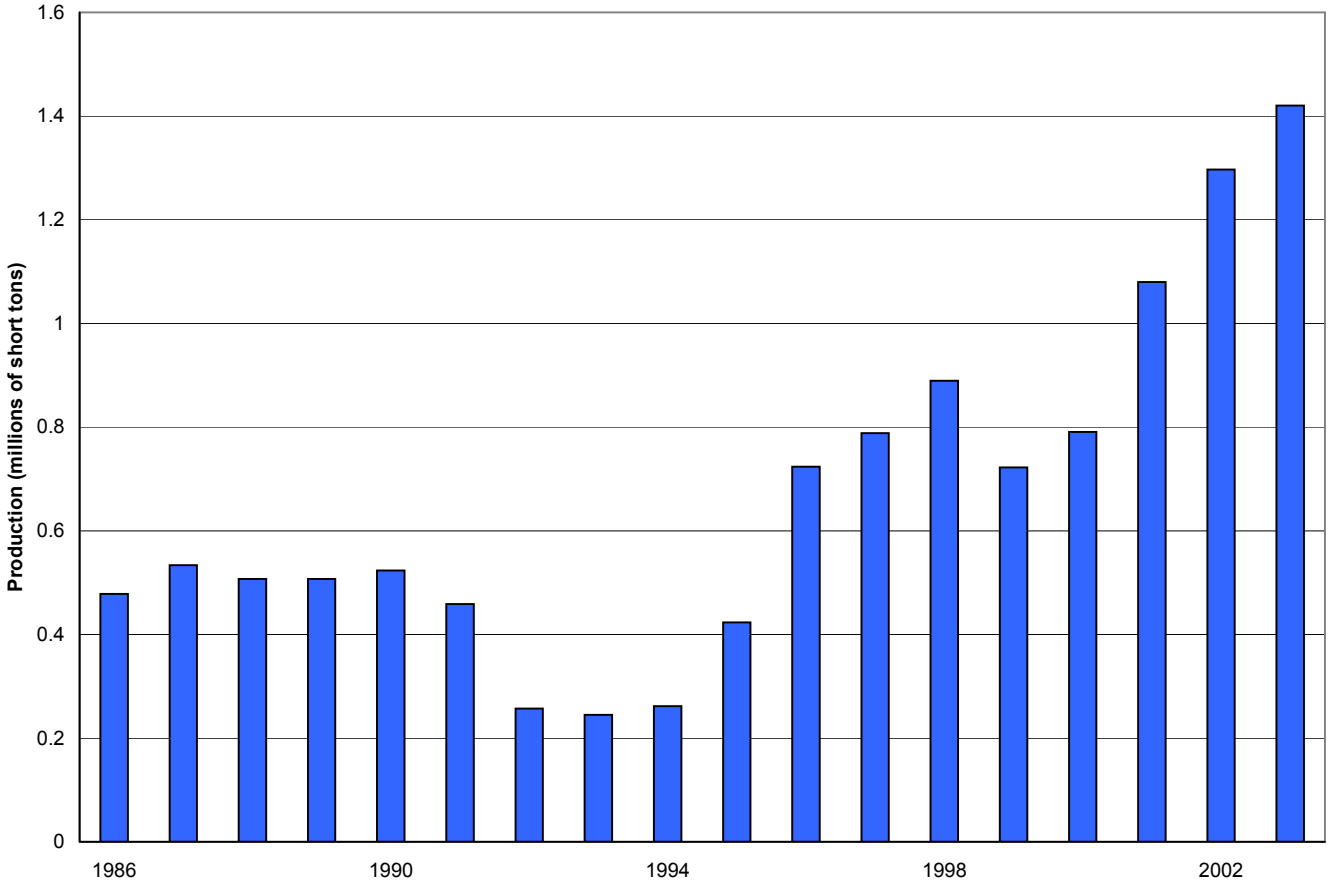


Figure 16. Dimension stone production in Virginia, 1986-2003.

for use as monument stone, building facing stone, countertops, and exterior flooring. These operators extract material from diabase dikes and sills in the Mesozoic Culpeper basin. The quarried blocks are trucked to South Carolina finishing plants or exported overseas to be finished and polished.

Slate has been produced in central Virginia for use as roofing material since the late 1700s. LeSueur-Richmond Slate Corporation currently produces slate from its Buckingham Slate Quarry in the Arvonia area of Buckingham County (Figure 17). The slate is used as material for facing stone, signs, roofing shingles, flooring tiles, and for hearths and sills. The dark blue-gray slate is extracted from the Ordovician Arvonia Formation. Slate production rose from 1999 to 2003. This increase was probably related to the renewed popularity of slate as a roofing material.

Figure 17. LeSueur-Richmond Slate Corporation's Buckingham Slate quarry in Arvonia, Buckingham County (photograph by Stanley S. Johnson).

The Alberene Soapstone Company, formerly known as the New World Stone Company, produces soapstone from a quarry in Albemarle County near Schuyler (Figure 18). Soapstone production from 1999 to 2003 was negligible and it was obtained from a stockpile for use as wall or flooring tiles, countertops, fireplaces, landscaping pavers, and sculpture stone.

Quartzite is extracted for use as flagging material from Mower Quarries in Fauquier County, north of Warrenton. The quartzite is quarried from sandstones in the Cambrian Chilhowee Group.

## Feldspar

In 2003, Virginia ranked second in the nation in feldspar production (Potter, 2003a). Feldspar production and price rose slightly overall from 1999 to 2003. Currently, Virginia has two mines actively producing feldspar, both from anorthosite bodies. The Montpelier Anorthosite in Hanover County is mined by U. S. Silica Corporation for aplite to be used in the manufacturing of container glass and fiber glass insulation (Figure 19). The feldspar provides alumina, which prevents devitrivication and improves durability of the glass. The feldspar-rich rock is extracted using open pit methods, then crushed, classified, and dried onsite. Heavy minerals are removed from the material by electrostatic and magnetic processes. The processed material is then transported by truck and rail to markets in New Jersey, Pennsylvania, Ohio, Indiana, and Virginia. In 2003, 236 thousand short tons of feldspar were produced by the U. S. Silica operation (Figure 20 and 21). Aplite is also mined from the Roseland anorthosite body at the Piney River quarry in Amherst County by Boxley Materials Company and crushed for use as aggregate (these numbers are included in the crushed-stone numbers).

Figure 18. Earlier operations of a soapstone quarry in Nelson County (photograph by Palmer C. Sweet).

Figure 19. U.S. Silica feldspar mine in Hanover County (photograph by Stanley S. Johnson).

## Gypsum

U. S. Gypsum, the nation's largest wallboard producer, closed its Locust Cove mine near Rich Valley in Smyth County in 1999. It supplied gypsum to its wallboard plant in nearby Plasterco, Virginia. The mine was a slope-entry underground mine that extended more than 800 feet below the surface. The mine utilized the modified room-and-pillar sublevel stoping mining method. Gypsum was extracted from the Mississippian Maccrady Shale, where it occurred as isolated masses surrounded by gray shale and red clays. Final production in 1999 was approximately 304 thousand short tons (Figure 22).

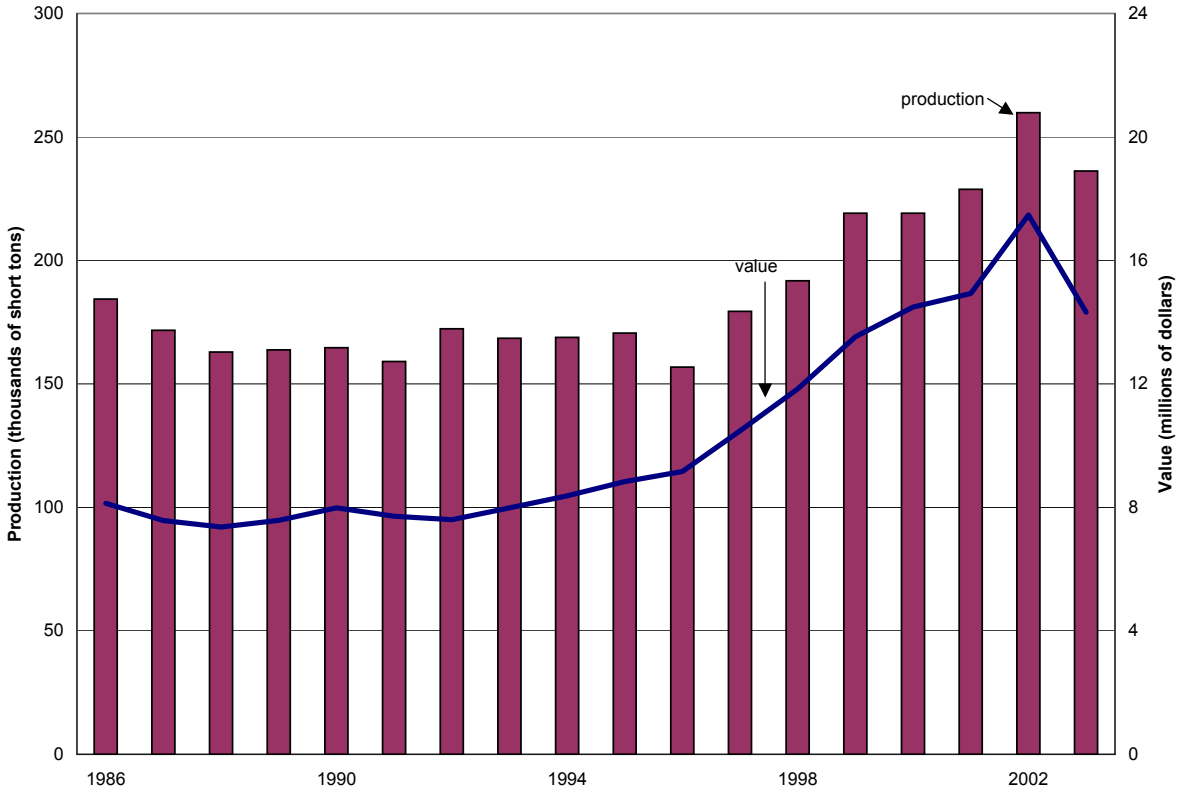


Figure 20. Feldspar production and value 1986-2003.

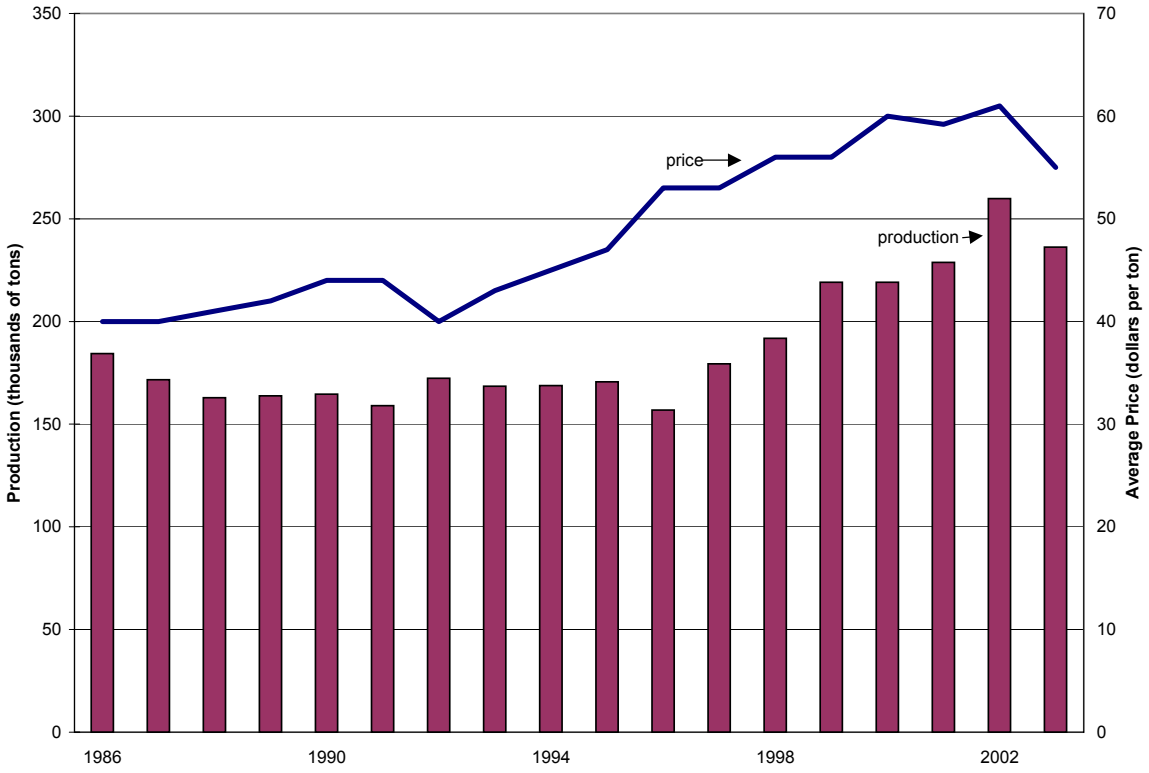


Figure 21. Feldspar production and price 1986-2003.

## Heavy Mineral Sands

Virginia ranked second in the United States in both titanium and zirconium production in 2003 (Gambogi, 2003). Iluka Resources produced approximately 360 thousand short tons of heavy-mineral concentrate from its Old Hickory operation in Dinwiddie County in 2003 (Figure 23). Heavy mineral concentrate production increased by more than 50 percent from 1999 to 2003. Ilmenite, leucoxene, rutile, and zircon make up approximately 80 percent of the heavy- mineral concentrate. These minerals are extracted from Pliocene beach sands (Figure 24).

Titanium minerals extracted from the mine are used to manufacture titanium dioxide pigment for house and car paints, plastics, sunscreens, paper, and textiles. Zircon is used in the manufacture of ceramics and refractories. Initial processing is done onsite in the company's concentrator. Gravity spirals are used to separate the denser heavy minerals, then electrostatic and magnetic separators separate the individual heavy-mineral constituents. Concentrated material is trucked to the company's processing plant at Stoney Creek in Sussex County, from which the final product is shipped.

## Industrial Sand

In 2003, Unimin Corporation produced about 432 thousand short tons of industrial sand from its mine near Gore in Frederick County (Figure 25). Production of industrial sand has remained fairly constant from 1999 to 2003 (Figure 25 and 26). The high silica purity of this

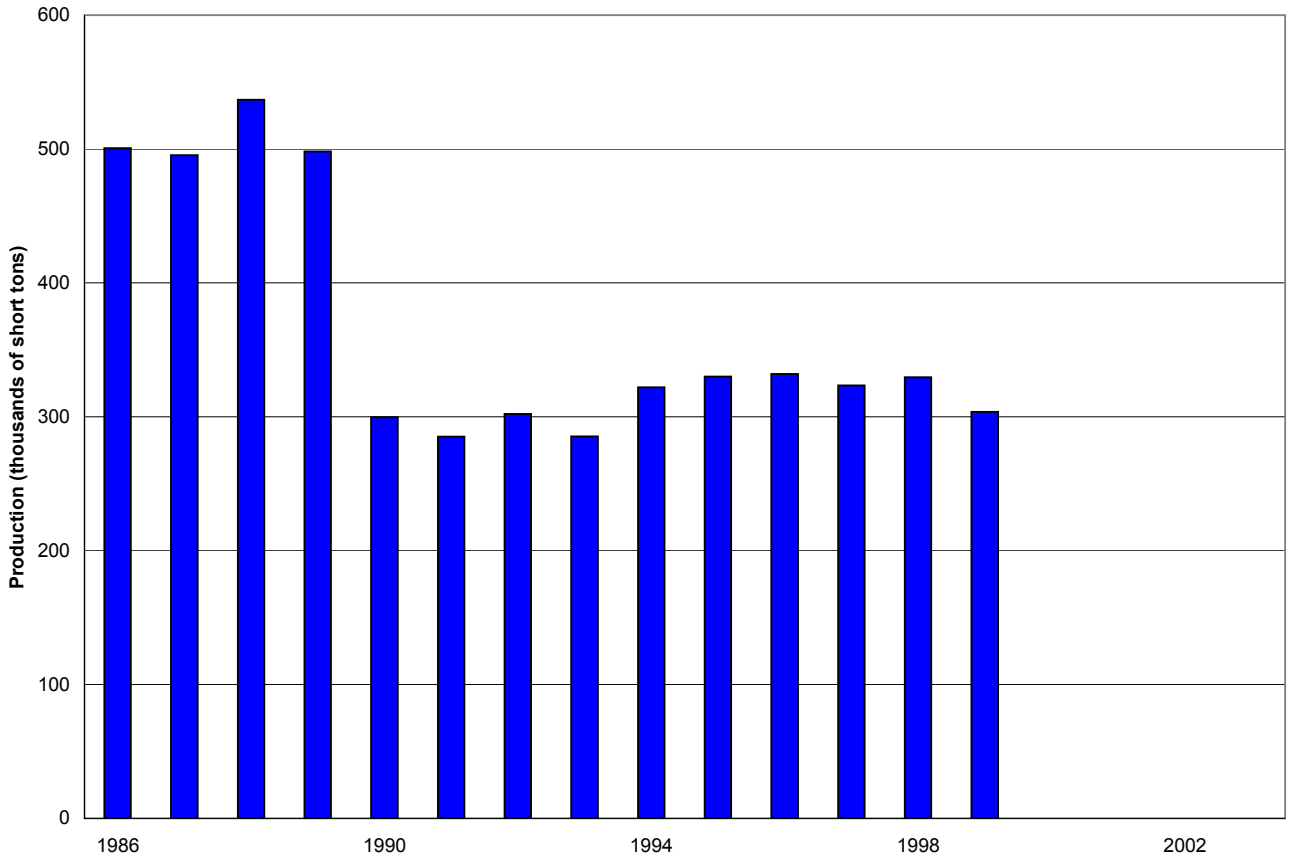


Figure 22. Gypsum production in Virginia, 1986-1999.

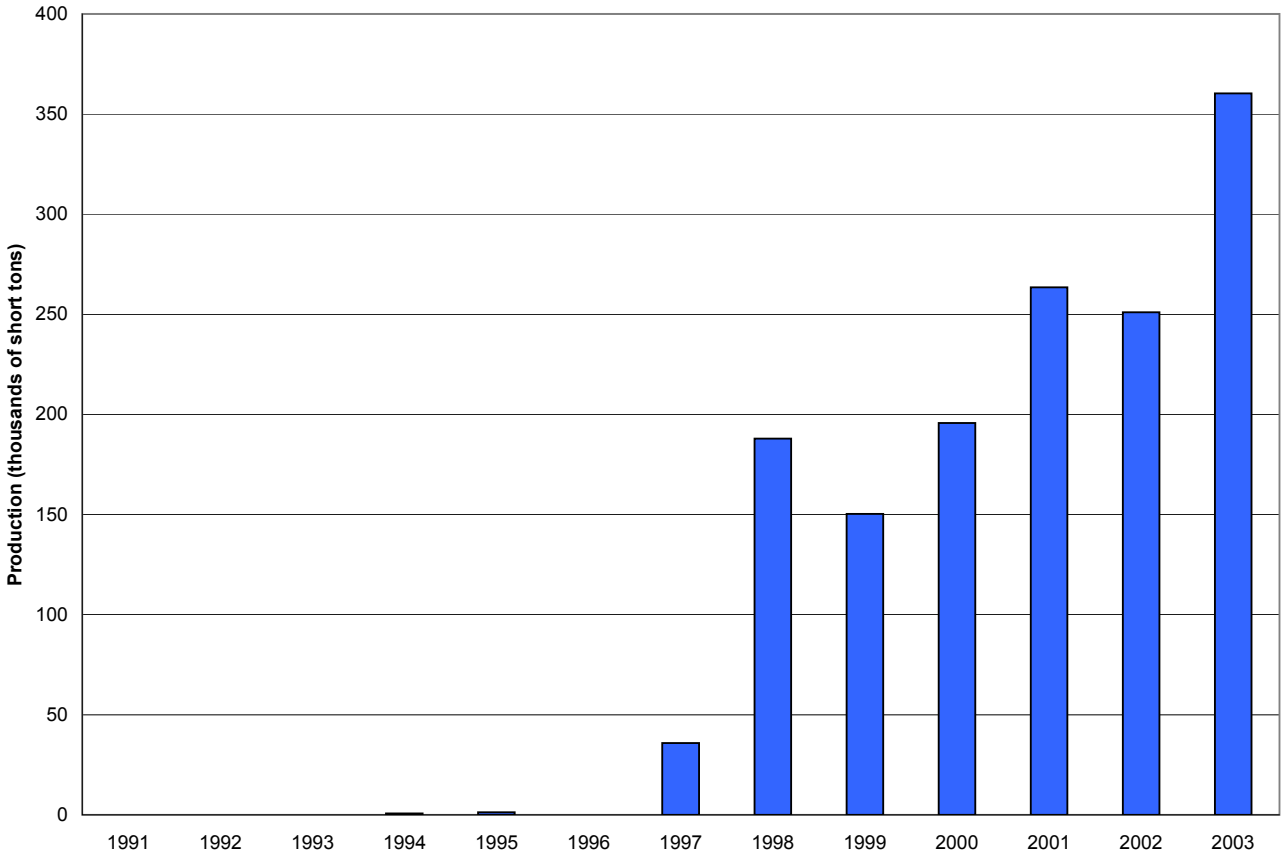


Figure 23. Heavy-mineral sand production in Virginia, 1991-2003.

Figure 24. Heavy mineral sand mine in Dinwiddie County (photograph by Stanley S. Johnson).

sand makes it suitable for glass production. The sand is extracted from the Devonian Ridgeley Sandstone.

## Iron-Oxide Pigments

Natural iron-oxide pigments have been used for centuries as coloring agents. Iron-oxide pigments are valued because they are nontoxic, weather resistant and they do not bleed or fade. In Virginia, the pigments are extracted from a range of ores including hematite, goethite, limonite, siderite, and magnetite. Hematite produces red pigments, limonite and goethite produce yellow and brown pigments, siderite produces brown and red pigments, and magnetite yields black pigments.

Virginia is one of four states actively producing natural iron-oxide pigments. In 2003, approximately 519 short tons of natural iron-oxide were reportedly mined and produced from stockpiles in Virginia, making it the fourth largest producer in the United States (Figure 27) (Potter, 2003b). Hoover Color Corporation in Hiwassee, Pulaski County, produces ochre, umber and sienna. Hoover Color also produces iron-oxide pigments from the Painter Mine in Wythe County. Open pit methods are used to mine natural iron-oxides near the contact of the Cambrian Erwin Formation with the overlying Cambrian Shady Dolomite (Figure 28). Deposits, associated with gossans formed from weathering Cambrian rocks, are concentrated as small bodies or pockets consisting of insoluble clay and iron oxide. The iron-oxides were formed by precipitation from iron-enriched groundwater.

Raw iron-oxide ore is processed at the Hiwassee plant where it is pulverized, dried, air separated, blended, and packaged before shipping. Hoover Color manufactures a variety of blended pigments for use as coloring agents in paint, industrial coatings, art supplies (crayons, chalk, water colors), and building products (colored cinder blocks and bricks). Hoover Color ships pigments throughout North America.

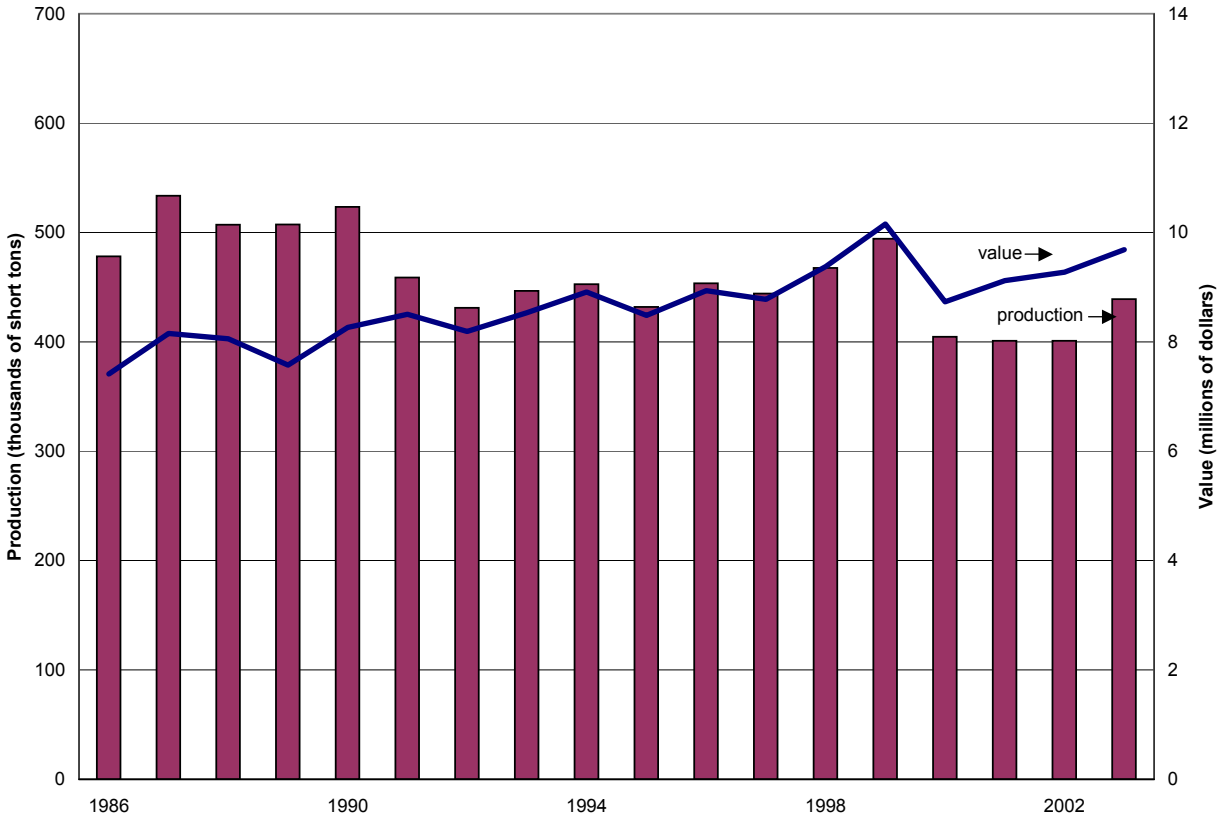


Figure 25. Industrial sand production and value 1986-2003.

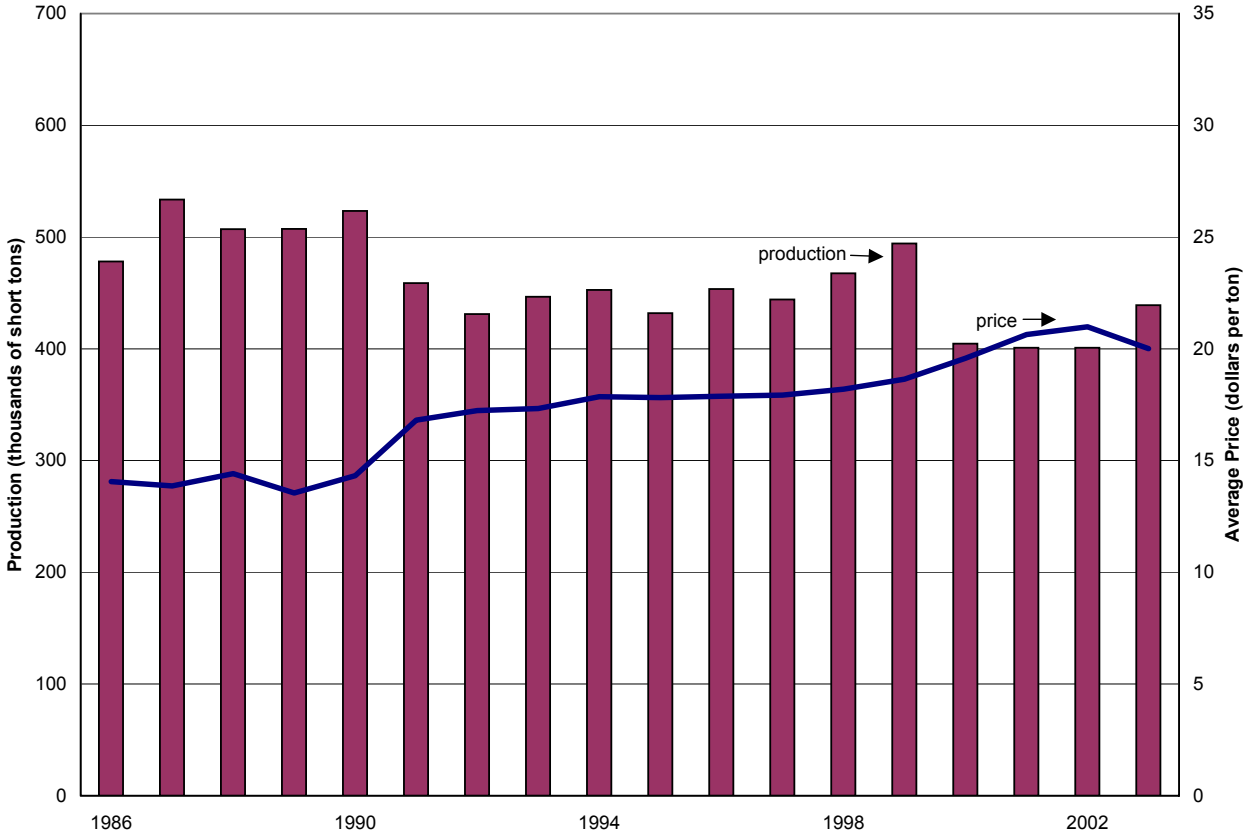


Figure 26. Industrial sand production and price 1986-2003.

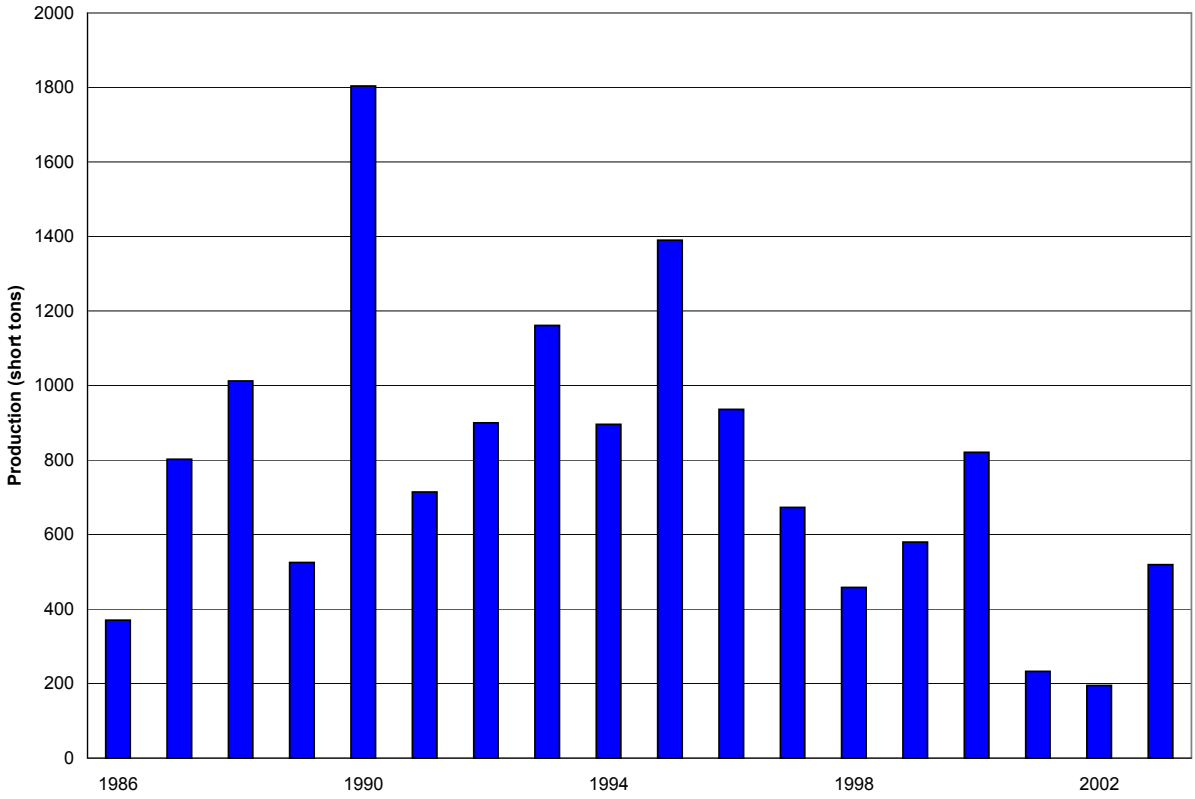


Figure 27. Iron-oxide production in Virginia, 1986-2003.

Figure 28. Iron oxide-rich rocks in the Hoover Color Corporation mine in Hiwassee, Pulaski County (photograph by Phyllis L. Newbill).


Figure 29. One of Kyanite Mining Corporation's processing facilities at Willis Mountain, Buckingham County (photograph by David B. Spears).

## Kyanite

Kyanite is an aluminosilicate mineral and a member of the sillimanite group (kyanite, sillimanite, andalusite), all of which have the same chemical formula, $Al_2SiO_5$. Because it is physically stable at high temperatures, kyanite has many industrial applications. It is used primarily as an additive in the production of high-temperature ceramic products such as furnace bricks but is also used in abrasives, brake shoes, cookware, and a wide variety of other industrial and consumer products. The major consumers of kyanite are the steel and aluminum industries.

Kyanite Mining Corporation, located in Buckingham County, is the only producer of kyanite in North America and the largest producer in the world. The company operates two open pit mines a mile apart, one at Willis Mountain (Figure 29) and one at East Ridge. The ore bodies are part of a kyanite quartzite zone within the Chopawamsic Formation, which is a sequence of metavolcanic and metasedimentary rocks of Ordovician age. Willis Mountain and East Ridge are on the west and east limbs, respectively, of the Whispering Creek anticline. The company reports over four million short tons of demonstrated reserves (Kyanite Mining Corporation, 2005).

The company's processing facilities include jaw crushers, rod and ball mills, spiral, magnetic and froth floatation separators, and calcining kilns. Some of the kyanite is calcined to produce mullite, which is even more thermally stable than kyanite. Mullite results from the irreversible expansion of kyanite at about 3000° F. Both kyanite and mullite are shipped in bulk by railcar from a local railhead, or bagged and shipped by rail or truck. Product is shipped to a wide range of domestic and overseas markets including Europe, Latin America, and the Pacific Rim. The company also markets pyrite, magnetite, muscovite, and silica sand byproducts.

Annual production figures for processed kyanite and mullite are not available. The U.S. Geological Survey estimates that production has remained fairly stable, at about 90,000 short tons per year for kyanite and 40,000 short tons per year for mullite. Domestic consumption is closely tied to the steel industry, which has been in general decline in recent years. Consumption is reportedly below installed production capacity. In 2003, the estimated market price for kyanite was $165 per short ton and, for mullite, $279 short per ton (Potter, 2004a).

## Vermiculite

Vermiculite is a hydrated magnesium-iron-aluminum silicate: $(Mg,Fe^{++},Al)_3(Al,Si)_4O_{10}(OH)_2 \cdot 4(H_2O)$. It is used as a fertilizer carrier, as a lightweight concrete additive, as an industrial absorbent, and in fireproof insulation and sound insulation. One company, Virginia Vermiculite LLC, produces vermiculite in Virginia. The company operates an open pit mine near Trevilians, in Louisa County. This is one of only three active vermiculite mines in the United States. The other two mines are in South Carolina. The deposit is in an 80- to 100-foot-thick weathered zone in mafic rocks of the Green Springs pluton (Figure 30). The soft ore is excavated with earth moving equipment, then washed and milled. The vermiculite is separated from other minerals by froth flotation and is then dried and screened to produce four different sizes of product.

Annual production peaked in 1999 at 48,256 short tons. Since then, production has decreased somewhat to 34,391 short tons in 2003 (Figure 31). Average annual production from 1999 to 2003 was 39,211 short tons. Vermiculite's increasing use in building applications and in fireproofing processes may account for the large increase in its price in 2002 (Figure 32). The U.S. Geological Survey reports a 2003 market price of $143 per short ton for vermiculite (Potter, 2004b).

## Salt

Virginia Gas Pipeline Company (VGPC) owns a storage facility for natural gas storage in former salt mines in Saltville, Smyth County. To manage the brines associated with this storage facility, VGPC built an evaporator plant for use in processing salt brine that was pumped from the cavern. In 2000, VGPC began selling the salt that

Figure 30. Open cut in weathered mafic rocks of the Green Springs pluton; Virginia Vermiculite LLC, Louisa County (photograph by Stanley S. Johnson).

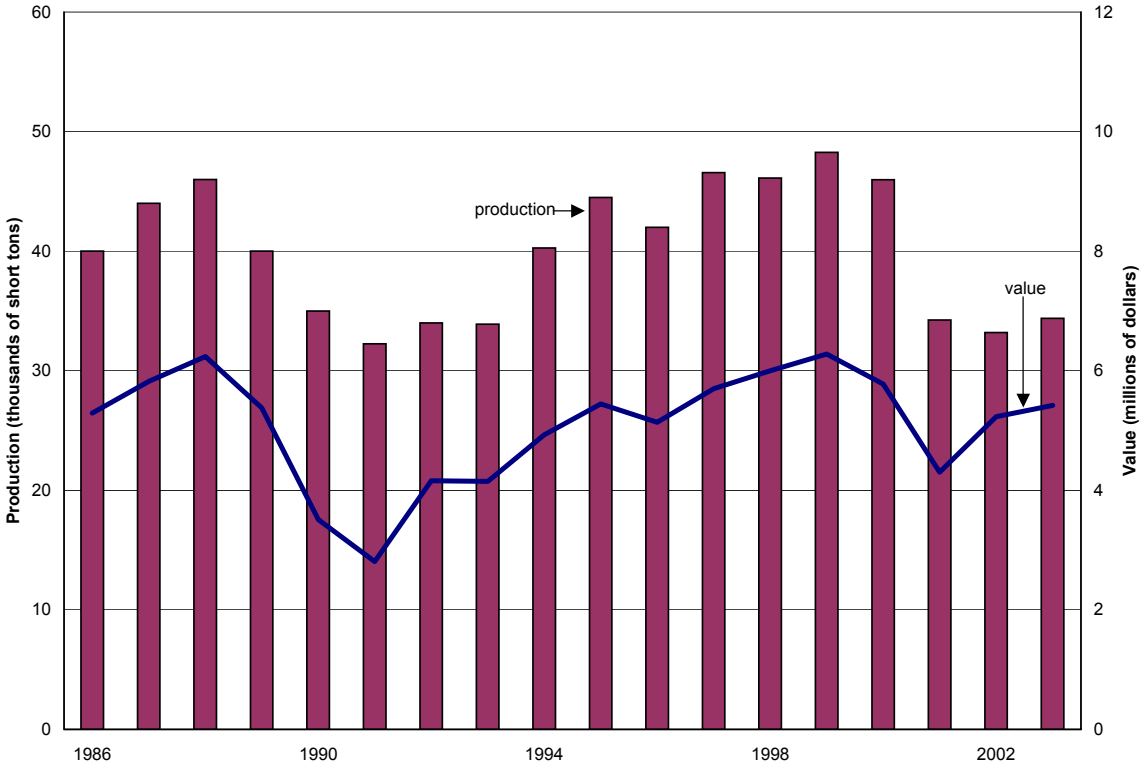


Figure 31. Vermiculite production and value 1986-2003.

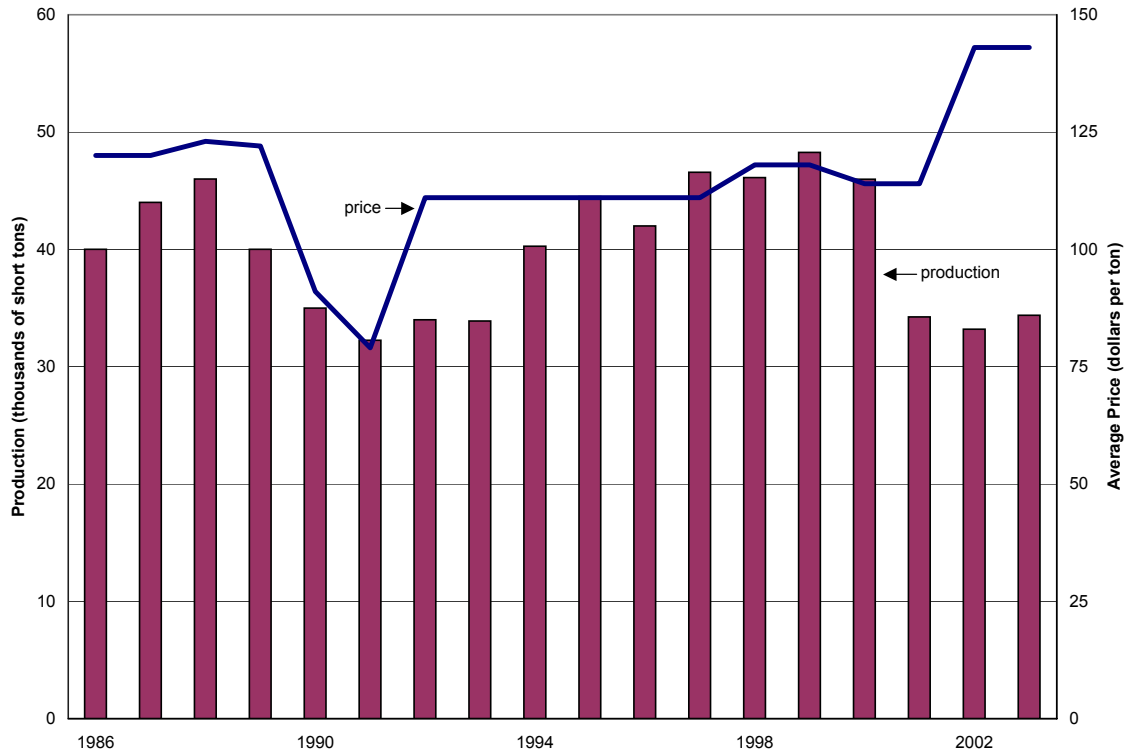


Figure 32. Vermiculite production and price 1986-2003.

crystallized from the brine to various agricultural markets in Virginia, Tennessee, Georgia, North Carolina, and South Carolina. From 2000 to 2003, the Saltville Brine Field produced a total of 142 thousand short tons of salt (Figure 33).

The salt, like the gypsum in the area, is in the Mississippian Maccrady Shale. Like the gypsum, the salt is in isolated masses as a result of tectonic brecciation of evaporite beds when the southeastern limb of the Greendale syncline was overturned by overthrusting along the Saltville fault (Cooper, 1966).

## Gemstones

Gemstones are extracted from the Morefield Gem Mine in Amelia County. Minerals such as blue-green amazonstone, beryl, topaz, tantalite, tourmaline, and zircon can be found in the Morefield pegmatite. The mine consists of a single shaft within the quartz-feldspar pegmatite vein (Figure 34). It is open to the public for a fee, and produced 109 short tons of gemstones and other mineral material in 2003. Recreational mining and collecting of gemstones by amateur mineral collectors does not require a mining permit. There are no records of production for these activities.

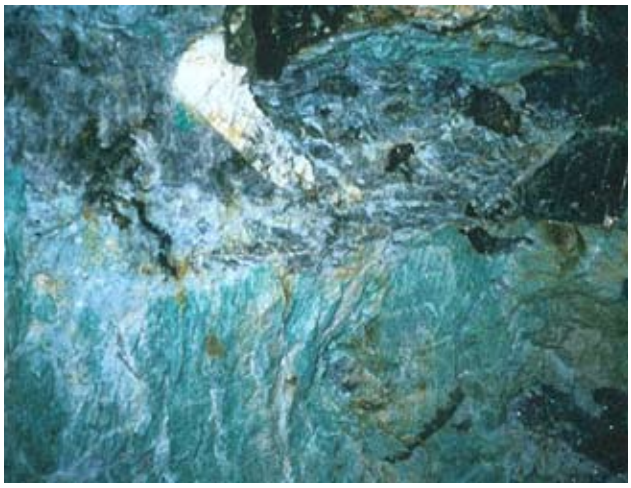

Figure 34. The Morefield pegmatite in the underground Morefield Gem mine in Amelia County (photograph by Palmer C. Sweet).

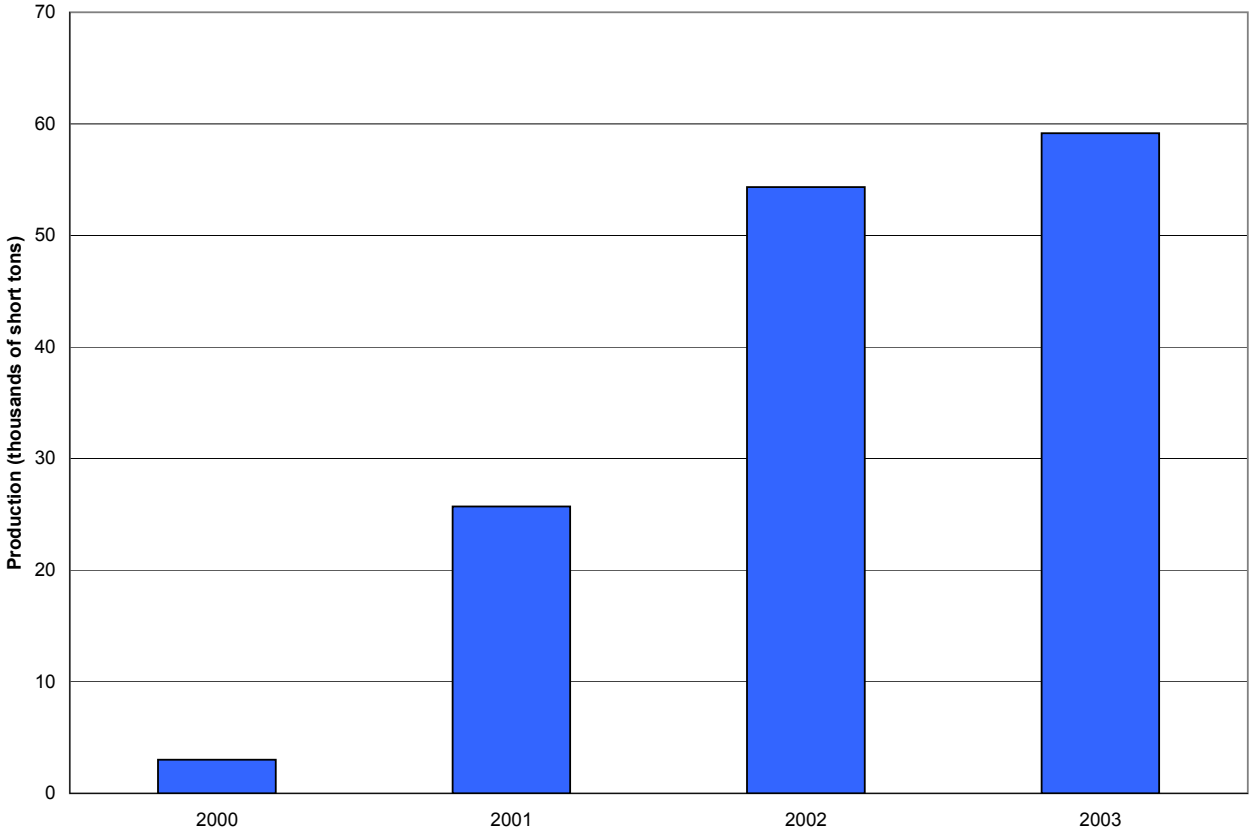


Figure 33. Salt production in Virginia, 2000-2003.

## FOSSIL FUEL RESOURCES

### Coal

From 1999 to 2003, the U.S. produced more than 1 billion short tons of coal annually, peaking at a record production level of 1.13 billion short tons in 2001.[1] This continues the general long-term trend of increasing coal production within the U.S., and places the U.S. among the leading coal producing nations in the world.[2]

Reflecting current national production levels, coal is the largest single source of domestically produced primary energy within the United States. According to the Energy Information Administration (EIA), coal accounted for about 32 percent of total energy production within the nation between 1999 and 2003 (measured in British thermal units) – which was more than all other single domestic energy production sources tracked including natural gas, petroleum, nuclear power, wood, hydroelectric, geothermal, wind, and solar.[3] During this period, approximately 95 percent of the coal produced within the U.S. was distributed domestically,[4] and more than 90 percent of this was consumed by the electric power sector.[5] Between 1999 and 2003, coal accounted for about 51 percent of the electric power generated within the U.S. – which was more than all other sources, including nuclear, hydroelectric, natural gas, and petroleum, combined.[6] These factors, along with its relatively stable and abundant domestic supply, secures an important role for coal in the U.S. energy profile.

Although not widely recognized, coal mining within Virginia has a long and important history of contribution to the economy of the state. Dating back to the first reported commercial production in the United States in 1748 from mines near Richmond, Virginia (Wilkes, 1988, p. 1), coal has been continuously mined in the state for almost 260 years – longer than any other state in the nation. Through 2003, more than 2.4 billion short tons of coal have been produced from Virginia.[7] Currently mined from a relatively small area in the southwestern portion of the state, coal is by far the most valuable single mineral resource produced in Virginia – approaching $1 billion in estimated value each year from 1999 to 2003 (Table 6, Figure 35). In 2003, coal accounted for 46 percent of total mineral value produced in the state (Figure 2). In addition, Virginia generally ranks among the top ten coal producing states in the nation,[8] making it an important contributor to total national production and the U.S. energy profile.

Coal deposits within Virginia are found in three widely separated areas of the state encompassing a total of approximately 2000 square miles: The Eastern Coalfields (consisting of two relatively small basins near Richmond and Farmville), the Valley Coalfields (consisting of ten long, narrow coal-bearing areas in the Valley and Ridge physiographic province of Virginia in the western part of the state), and the Southwest Virginia Coalfield (the coalfield in the southwestern portion of Virginia). Historically, commercial production has been limited to the Richmond Coalfield, coal deposits in the southern portion of the Valley Coalfields (centered around Montgomery and Pulaski counties), and the Southwest Virginia Coalfield

[1] U.S. Department of Energy, 2004a, Table 7.2, p. 203.

[2] U.S. Department of Energy, 2004a, Table 11.14, p. 321.

[3] U.S. Department of Energy, 2004a, Table 1.2, p. 7.

[4] U.S. Department of Energy, 2004a, Table 7.1, p. 201.

[5] U.S. Department of Energy, 2004a, Table 7.3, p. 205.

[6] U.S. Department of Energy, 2004a, Table 8.2a, p. 224.

[7] 1748 to 1882 data compiled in Brown and others, 1952, Table 5, p. 37; 1883 to 1949 data compiled in Brown and others, Table 6, p. 42-43; 1950 to 1979 data compiled in Hibbard, 1990, p. 50; 1980 to 2003 data compiled from annual production reports from the Virginia Department of Mines, Minerals and Energy, Big Stone Gap, Virginia.

[8] U.S. Department of Energy, 2001, Table 1, p. 4; U.S. Department of Energy, 2002, Table 1, p. 4; U.S. Department of Energy, 2003a, Table 1, p. 8-9; U.S. Department of Energy, 2003b, Table 1, p. 8-9; U.S. Department of Energy, 2004b, Table 1, p. 10-11.

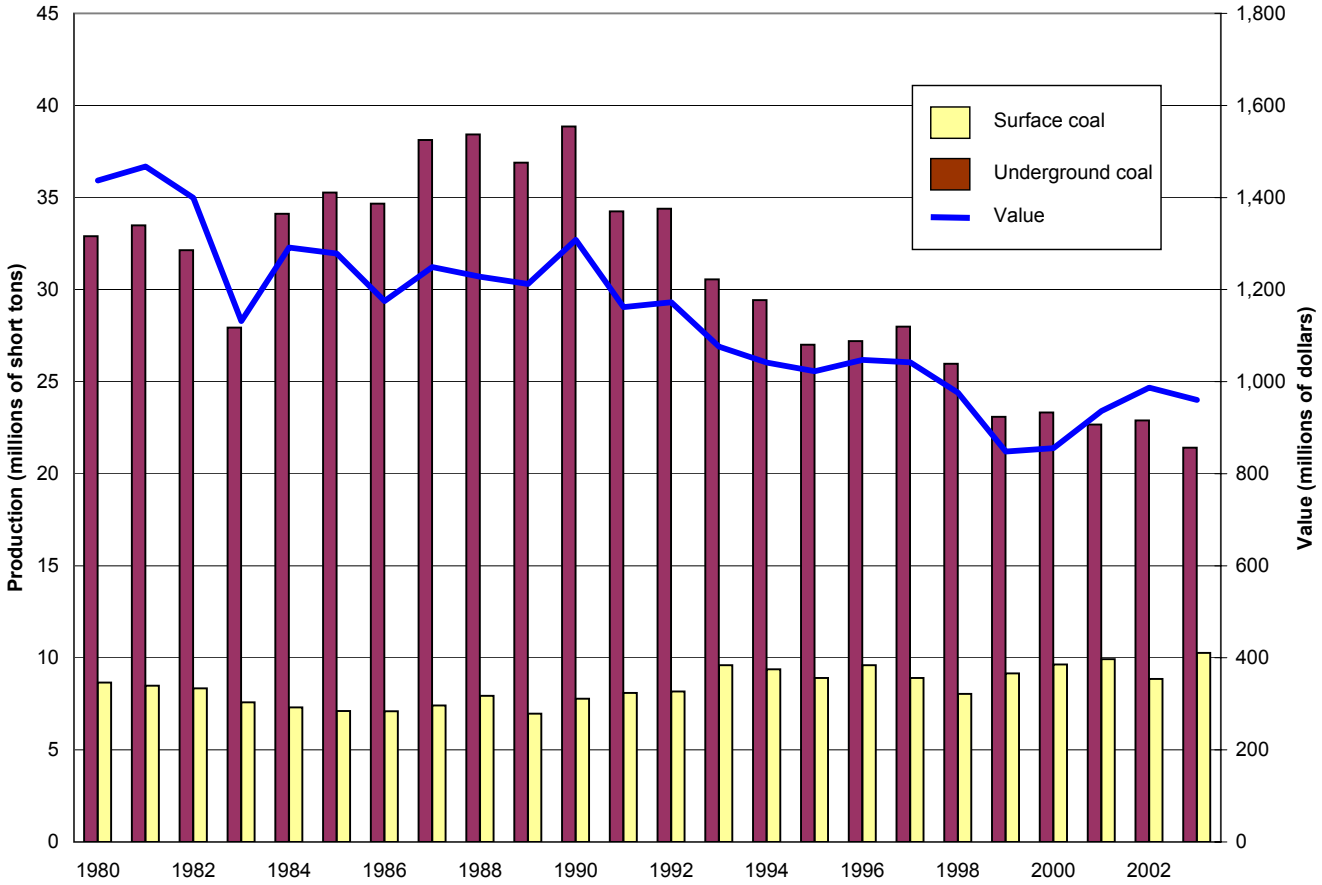


Figure 35. Coal production by mining method and total value, 1980-2003.

(Figure 36). Each coalfield occurs within a different geologic setting in the state. The coal beds in these fields were deposited at different times, and have been subjected to different tectonic and alteration events. As a result, each coalfield contains coal resources with different quality and physical properties. Coals range from high-volatile bituminous to natural coke in the Richmond Coalfield (Wilkes, 1988, p. 3-6), medium-volatile bituminous to semi-anthracite in the Valley Coalfields (Brown and others, 1952, p. 31-35), and low- to high-volatile bituminous in the Southwest Virginia Coalfield (Wilkes and others, 1992). While mining has occurred in all three areas, virtually all production in Virginia since the 1950's has come from the Southwest Virginia Coalfield.

The Southwest Virginia Coalfield encompasses approximately 1,550 square miles of surface area and includes all or part of Buchanan, Dickenson, Lee, Russell, Scott, Tazewell, and Wise counties. This coalfield is part of the extensive Appalachian Coal Basin, which extends from Pennsylvania to Alabama. Specifically, the Southwest Virginia Coalfield lies along the southeastern flank of the central Appalachian Basin coal region, adjacent to the Eastern Kentucky and Southern West Virginia coalfields. The coals are Pennsylvanian in age and generally of very high quality – with less than 1 percent sulfur, less than 8 percent ash, and a high energy content of 12,500 to more than 14,000 Btu's per pound (Wilkes and others, 1992). Although quality parameters vary locally, volatile matter generally increases from east to west and up section from older to younger coals beds – where it ranges from about 18 percent in the Pocahontas No. 3 coal bed to nearly 40 percent in coal beds in the upper part of the Wise Formation (Wilkes and others, 1992). Within recent years, more than 85 percent of Virginia's coal production has come from Buchanan,

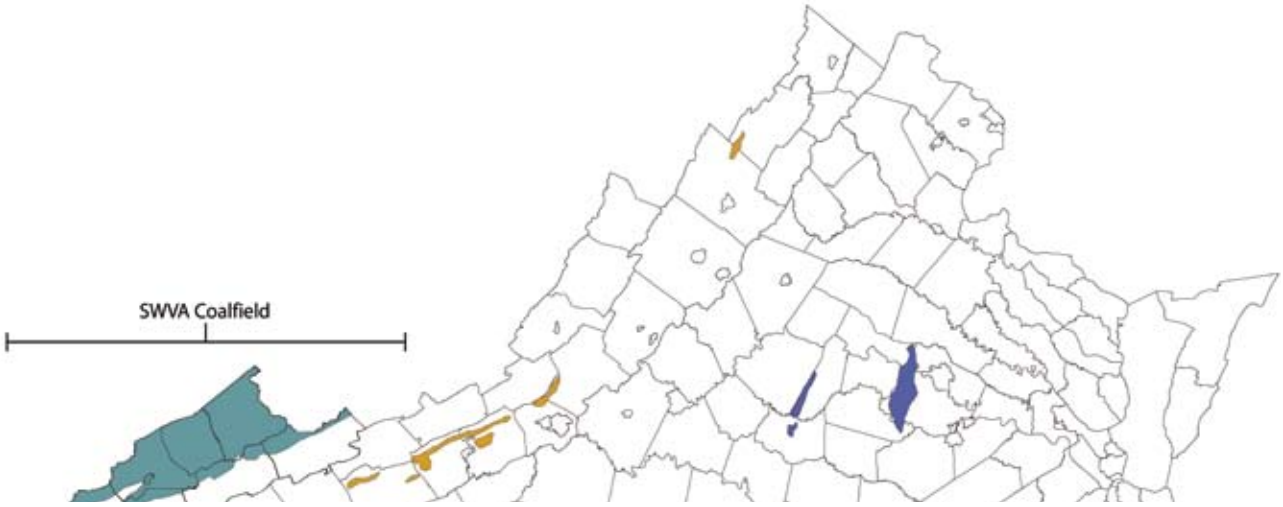


Figure 36. Locations of coal in Virginia. The Eastern Coalfields consist of two relatively small basins near Richmond and Farmville (shown in blue); the Valley Coalfields consists of long, narrow coal-bearing areas in the Valley of Virginia located in the western part of the state (shown in orange); and the Southwest Virginia Coalfield is the large coalfield located in the southwestern portion of Virginia.

Dickenson, and Wise counties (Tables 7, 8, 9, 10, 11).

Total coal production in Virginia from 1999 to 2003 averaged 32.3 million short tons per year; and ranged from 31.7 million short tons produced from 296 mines in 2003, to 33.0 million short tons produced from 345 mines in 2000 (yearly production shown on Tables 7, 8, 9, 10, 11; summarized on Table 12). The locations of active mines in 2003 are shown on Figures 37 and 38. The average annual production of 32.3 million short tons is about 5 percent below the 34.0 million short tons produced in 1998, and 30 percent below the record production of 46.6 million short tons in 1990 – but appears to have stabilized in the 30- to 40-million short tons range (Table 12).

During this period (1999-2003), underground mining accounted for approximately 70 percent of total production (averaging 22.7 million short tons per year), which included an average of 17.2 million short tons produced from continuous miner and conventional operations and an average of 5.5 million short tons produced from longwall operations. Surface mining accounted for the remaining 30 percent of total production (averaging 9.6 million short tons per year), which included production from large-area multiple bed surface mines, smaller area contour mines, and combination surface-auger mines (Tables 7, 8, 9, 10, 11). The current ratio of underground and surface mine production has been fairly consistent over the past five years, but shows more than a 10 percent decrease in the amount of coal that underground mining contributed to total production compared to 1990. In the peak years of coal production during the late 1980s and early 1990s, underground mining accounted for about 82 percent of total production and surface mining accounted for the remaining 18 percent (Table 12).

The Division of Mineral Resources currently recognizes 75 coal beds / coal zones and 5 major geologic formation boundaries within the 800 to 5,150-foot stratigraphic interval found in the Southwest Virginia Coalfield. Approximately

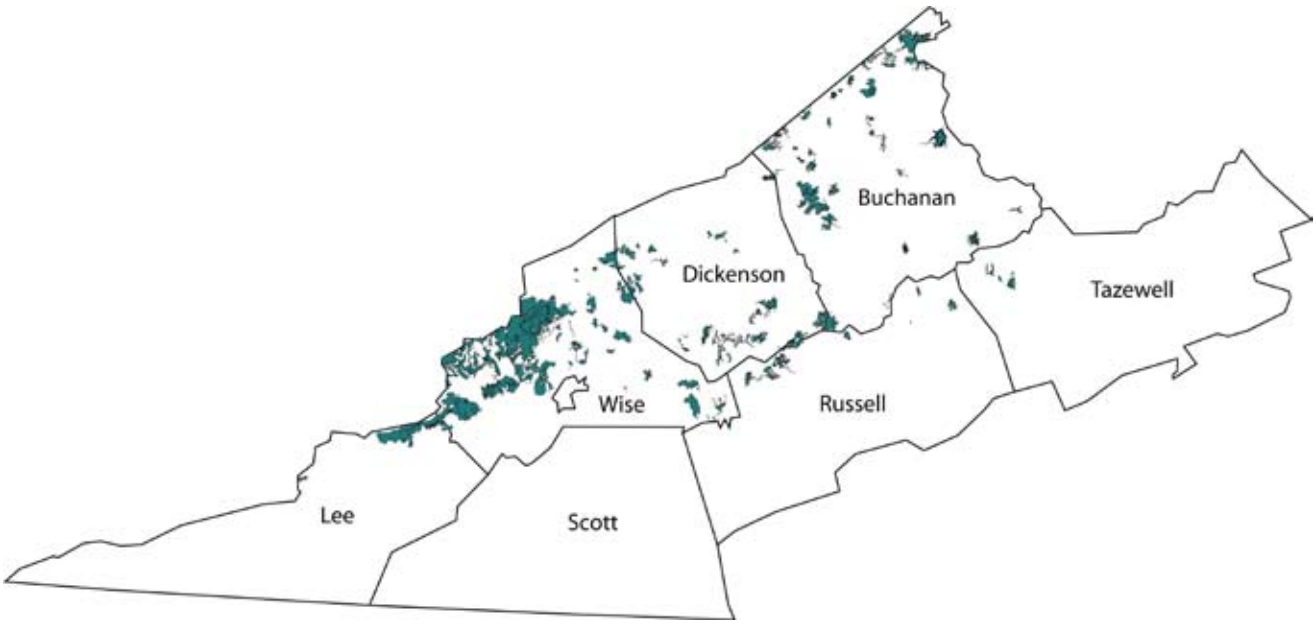


Figure 37. General locations of surface coal mine operations active during 1999-2003 (see Figure 36 for location of Southwest Virginia Coalfield).

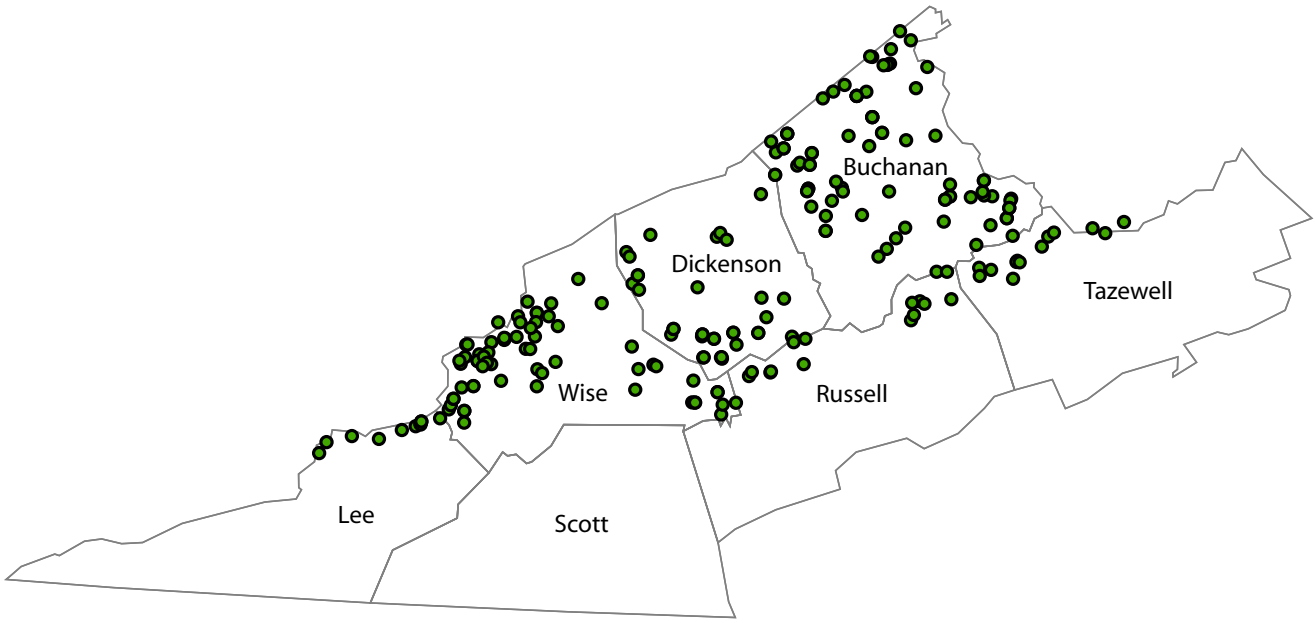


Figure 38. General locations of underground coal mine operations active during 1999-2003, (see Figure 36 for location of Southwest Virginia Coalfield).

55 of these coal beds / coal zones are classified as principal or key beds (Figure 39), which show significant regional extent or record of mining. Using regional, historical, local, and company coal bed names, production from as many as 63 coal beds is reported to the Division of Mines each year. This data is then correlated to the principal or key coal beds, and compiled in stratigraphic order by the Division of Mineral Resources for this report series (Tables 13, 14, 15, 16, 17).

Between 1999 and 2003, coal was produced from 37 to 40 coal beds / coal zones each year (Tables 13, 14, 15, 16, 17). The Harlan Formation, the uppermost stratigraphic unit in the Southwest Virginia Coalfield, hosted one to two of the coal beds mined in a small area along the Virginia – Kentucky state border and accounted for less than 1 percent of total yearly production. The Wise Formation hosted 21 to 23 of the coal beds mined and accounted for 37.9 to 48.5 percent of total yearly production. The Norton Formation hosted six to seven of the coal beds mined and accounted for 18.4 to 24.5 percent of total yearly production. The lower Norton / Lee / New River Formation hosted five to seven of the coal beds mined and accounted for 10.9 to 16.7 percent of total yearly production. The Pocahontas Formation hosted two to four coal beds mined and accounted for 21.0 to 22.3 percent of total yearly production (Tables 18, 19, 20, 21, 22). Individually, the Pocahontas No. 3 coal bed was the most productive coal, accounting for 18.7 to 20.8 percent of total yearly production. Other significant producers included the Dorchester, Imboden, Jawbone, Low Splint, Lower Banner, Norton, and Taggart coal beds. Collectively, production from the top ten coal beds accounted for 65 to 70 percent of total production each year (Tables 18, 19, 20, 21, 22).

Although specific distribution and consumption markets change annually in response to national and global economic trends, the high quality coals with low sulfur and high energy content produced from the Southwest Virginia Coalfield are well suited for generating electricity (steam coal), producing coke (metallurgical coal), and supplying industrial users (other industrial coal). In addition, the geographic

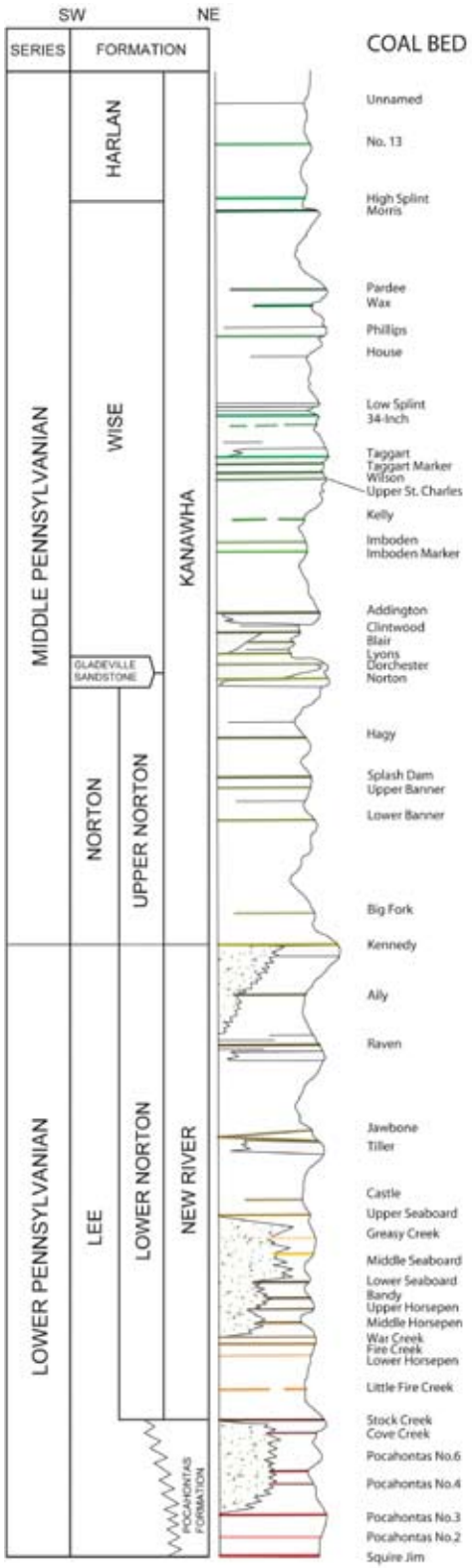


Figure 39. Generalized stratigraphic column of the sequence of Pennsylvanian formations and important coal beds in the Southwest Virginia Coalfield of the Appalachian Basin (modified from Wilkes and others, 1992).

location of Virginia provides proximity to major electric utility generating facilities in the southeastern U.S., steel making facilities in the eastern U.S., and major international ports along the mid-Atlantic and southeastern U.S. coastline. This often gives Virginia coal a transportation (delivered total cost) advantage over other coal producing states in the Appalachian Basin to both domestic and foreign customers.

Reflecting both coal quality and geographic location factors, destination and use (reported as distribution of U.S. coal by state of origin, destination, and consumer or expected use classification) of Virginia coal from 1999 to 2003 was quite different than the U.S. coal industry average. Nationally, approximately 95 percent of total U.S. coal distribution was shipped domestically,[9] and about 90 percent of this coal was used to generate electricity.[10] The remaining 5 percent of total U.S. coal distribution was shipped to foreign consumers,[11] and approximately 60 percent of this was classified as metallurgical coal. [12] Collectively (total domestic plus total foreign distribution to a single consumer sector), about 85 percent of total U.S. coal distribution was shipped as steam coal to generate electricity,[13] and only about 5 percent of total U.S. coal distribution was shipped as metallurgical coal to produce coke.[14]

In sharp contrast, approximately 75 percent of total Virginia coal distribution was shipped domestically,[15] and only about 65 percent of this coal was used to generate electricity. [16]

[9] U.S. Department of Energy, 2001, Table 56, p. 87; U.S. Department of Energy, 2001, Table 57, p. 88; U.S. Department of Energy, 2002, Table 56, p. 87; U.S. Department of Energy, 2002, Table 57, p. 88; U.S. Department of Energy, 2003c, p. 1; U.S. Department of Energy, 2003d, p. 1; U.S. Department of Energy, 2004c, p. 1.

[10] U.S. Department of Energy, 2001, Table 63, p. 140; U.S. Department of Energy, 2002, Table 63, p. 140; U.S. Department of Energy, 2003c, p. 63; U.S. Department of Energy, 2003f, p. 5; U.S. Department of Energy, 2004e, p. 38.

[11] U.S. Department of Energy, 2001, Table 56, p.87; U.S. Department of Energy, 2001, Table 57, p. 89; U.S. Department of Energy, 2002, Table 56, p.87; U.S. Department of Energy, 2002, Table 57, p. 89; U.S. Department of Energy, 2003c, p. 1; U.S. Department of Energy, 2003d, p. 1; U.S. Department of Energy, 2004c, p. 1.

[12] U.S. Department of Energy, 2001, Table 61, p. 107; U.S. Department of Energy, 2002, Table 61, p. 1074; U.S. Department of Energy, 2003c, p. 1-4; U.S. Department of Energy, 2003d, p. 1; U.S. Department of Energy, 2003e, p. 4; U.S. Department of Energy, 2004c, p. 1; U.S. Department of Energy, 2004d, p. 3.

[13] U.S. Department of Energy, 2001, Table 56, p. 87; U.S. Department of Energy, 2001, Table 62, p. 111; U.S. Department of Energy, 2001, Table 63, p. 63; U.S. Department of Energy, 2002, Table 56, p. 87; U.S. Department of Energy, 2002, Table 62, p. 1114; U.S. Department of Energy, 2002, Table 63, p. 140; U.S. Department of Energy, 2003c, p. 1; U.S. Department of Energy, 2003c, p. 4; U.S. Department of Energy, 2003c, p. 63; U.S. Department of Energy, 2003d, Table 1, p. 1; U.S. Department of Energy, 2003e, Table 2, p. 3; U.S. Department of Energy, 2003f, p. 5; U.S. Department of Energy, 2004c, p. 1; U.S. Department of Energy, 2004d, p. 3; U.S. Department of Energy, 2004e, p. 38.

[14] U.S. Department of Energy, 2001, Table 56, p. 87; U.S. Department of Energy, 2001, Table 61, p. 107; U.S. Department of Energy, 2001, Table 63, p. 140; U.S. Department of Energy, 2002, Table 56, p. 87; U.S. Department of Energy, 2002, Table 61, p. 107; U.S. Department of Energy, 2002, Table 63, p. 140; U.S. Department of Energy, 2003c, p. 1; U.S. Department of Energy, 2003c, p. 4; U.S. Department of Energy, 2003c, p. 63; U.S. Department of Energy, 2003d, p. 1; U.S. Department of Energy, 2003e, p. 3; U.S. Department of Energy, 2001f, p. 5; U.S. Department of Energy, 2004c, p. 1; U.S. Department of Energy, 2004d, p. 3; U.S. Department of Energy, 2004e, p. 38.

[15] U.S. Department of Energy, 2001, Table 56, p. 87; U.S. Department of Energy, 2001, Table 57, p. 88; U.S. Department of Energy, 2002, Table 56, p. 87; U.S. Department of Energy, 2002, Table 57, p. 88; U.S. Department of Energy, 2003c, p. 1; U.S. Department of Energy, 2003d, p. 1; U.S. Department of Energy, 200c, p. 1.

[16] U.S. Department of Energy, 2001, Table 63, p. 130; U.S. Department of Energy, 2002, Table 63, p. 131; U.S. Department of Energy, 2003c, p. 47; U.S. Department of Energy, 2003g, p. 2; U.S. Department of Energy, 2004e, p. 26.

The remaining 25 percent of Virginia coal was shipped to foreign consumers,[17] and 90 to 100 percent of this was classified as metallurgical coal.[18] Collectively (total domestic plus total foreign distribution to a single consumer sector), only about 50 percent of total Virginia coal distribution was shipped as steam coal to generate electricity,[19] and about 35 percent of total Virginia distribution was shipped as metallurgical coal to produce coke.[20] Recognized internationally, some of the world's highest quality metallurgical coals are mined in Virginia, and these generally command a higher price than steam or industrial coals.

An emerging growth market for Virginia coal appears to be distribution directly to domestic industrial plants. While nationally about 10 percent of total U.S. distribution is shipped directly to the domestic industrial sector,[21] this market has grown steadily from about 10 percent of total Virginia distribution in 1999 to 27 percent in 2003.[22]

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[17] U.S. Department of Energy, 2001, Table 56, p. 87; U.S. Department of Energy, 2001, Table 57, p. 88; U.S. Department of Energy, 2002, Table 56, p. 87; U.S. Department of Energy, 2002, Table 57, p. 88; U.S. Department of Energy, 2003c, p. 1; U.S. Department of Energy, 2003d, p. 1; U.S. Department of Energy, 2004c, p. 1.

[18] U.S. Department of Energy, 2001, Table 61, p. 106; U.S. Department of Energy, 2002, Table 61, p. 106; U.S. Department of Energy, 2003c, p. 1-2; U.S. Department of Energy, 2003d, p. 1; U.S. Department of Energy, 2003e, p. 1; U.S. Department of Energy, 2004c, p. 1; U.S. Department of Energy, 2004d, p. 1.

[19] U.S. Department of Energy, 2001, Table 56, p. 87; U.S. Department of Energy, 2001, Table 62, p. 109; U.S. Department of Energy, 2001, Table 63, p. 130; U.S. Department of Energy, 2002, Table 56, p. 87; U.S. Department of Energy, 2002, Table 62, p. 109; U.S. Department of Energy, 2002, Table 63, p. 131; U.S. Department of Energy, 2003c, p. 1-2; U.S. Department of Energy, 2003c, p. 47; U.S. Department of Energy, 2003d, Table 1, p. 1; U.S. Department of Energy, 2003e, Table 2, p. 1; U.S. Department of Energy, 2003g, p. 2; U.S. Department of Energy, 2004c, p. 1; U.S. Department of Energy, 2004d, p. 1; U.S. Department of Energy, 2004e, p. 26.

[20] U.S. Department of Energy, 2001, Table 56, p. 87; U.S. Department of Energy, 2001, Table 61, p. 106; U.S. Department of Energy, 2001, Table 63, p. 130; U.S. Department of Energy, 2002, Table 56, p. 87; U.S. Department of Energy, 2002, Table 61, p. 106; U.S. Department of Energy, 2002, Table 63, p. 131; U.S. Department of Energy, 2003c, p. 1-2; U.S. Department of Energy, 2003c, p. 47; U.S. Department of Energy, 2003d, Table 1, p. 1; U.S. Department of Energy, 2003e, Table 2, p. 1; U.S. Department of Energy, 2003g, p. 1; U.S. Department of Energy, 2004c, p.14; U.S. Department of Energy, 2004d, p. 1; U.S. Department of Energy, 2004e, p. 26.

[21] U.S. Department of Energy, 2001, Table 56, p. 87; U.S. Department of Energy, 2001, Table 63, p. 140; U.S. Department of Energy, 2002, Table 56, p. 87; U.S. Department of Energy, 2002, Table 63, p. 140; U.S. Department of Energy, 2003c, p. 1; U.S. Department of Energy, 2003c, p. 63; U.S. Department of Energy, 2003d, Table 1, p. 1; U.S. Department of Energy, 2003f, p. 5; U.S. Department of Energy, 2004c, p. 1; U.S. Department of Energy, 2004e, p. 38.

[22] U.S. Department of Energy, 2001, Table 56, p. 87; U.S. Department of Energy, 2001, Table 63, p. 130; U.S. Department of Energy, 2002, Table 56, p. 87; U.S. Department of Energy, 2002, Table 63, p. 131; U.S. Department of Energy, 2003c, p. 1; U.S. Department of Energy, 2003c, p. 47; U.S. Department of Energy, 2003d, Table 1, p. 1; U.S. Department of Energy, 2003g, p. 2; U.S. Department of Energy, 2004c, p. 1; U.S. Department of Energy, 2004e, p. 26.

## Natural Gas

The production of hydrocarbons, especially natural gas, is often closely associated with the production of coal. In Virginia, coalbed methane is produced from the same formations that are mined for coal. Conventional gas and oil are produced from older and deeper formations, as is illustrated in the simplified stratigraphic column (Figure 40).

Natural gas is dominantly a mixture of methane ($CH_4$), ethane ($C_2H_6$), propane ($C_3H_8$), and carbon dioxide ($CO_2$). The term "gas" includes hydrocarbons which at atmospheric conditions of temperature and pressure are in a gaseous phase. The two types of natural gas produced in Virginia are: conventional gas, which has migrated from an organic source rock to a porous or fractured reservoir rock, and coalbed methane gas that is adsorbed on the coal as it is formed.

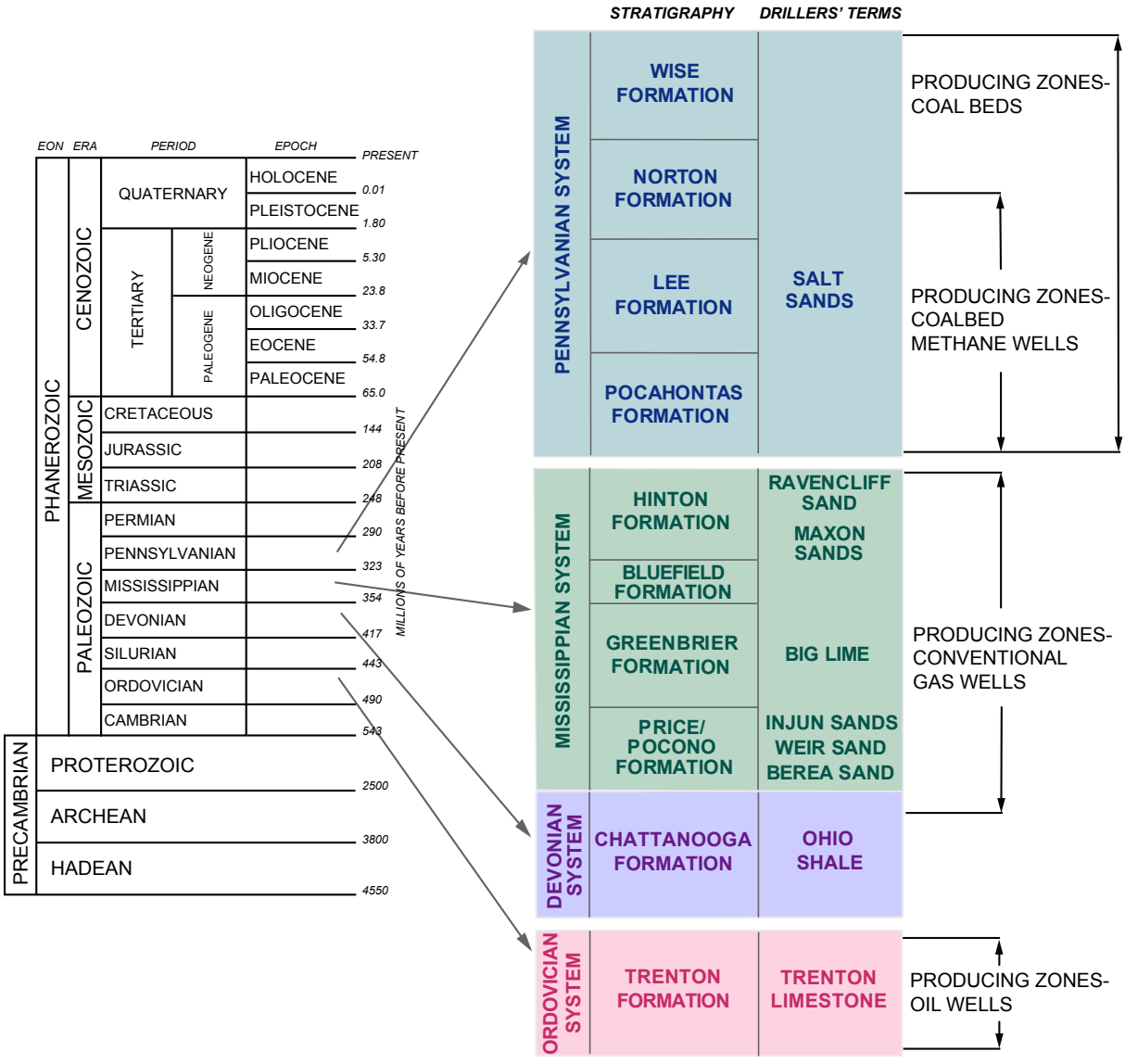


Figure 40. Generalized stratigraphic column showing productive intervals for oil, conventional gas, coalbed methane, and coal (modified from an illustration by Rick Cooper of the Division of Gas and Oil).

Conventional gas is produced from Devonian shales and Mississippian limestones and sandstones. According to Jacobeen (1992), all of the productive intervals exhibit low primary porosity, but have numerous tight fracture systems. These intervals must be mechanically fractured to establish commercial flow rates. Historical surface and subsurface structure mapping indicated that, although there are anticlinal folds interpreted in the subsurface, structural position has not been a significant factor in determining whether a well will be a producer. Completions in the Mississippian sandstones illustrated discontinuous reservoirs. Stratigraphic factors, though not fully understood, must influence the distribution of commercial quantities of gas (Jacobeen, 1992).

Coalbed methane is produced from the Pennsylvanian Norton, New River, Lee, and Pocahontas Formations. The distribution of these reservoirs is controlled by stratigraphy, with pinchouts to the north and west, and uplift and erosion to the southwest. The southeastern edge of the productive area is the boundary between the Appalachian Basin and the fold and thrust belt (Spears and Nolde, 2004). Coalbed methane is often produced in association with operating coal mines, because extraction in advance of mining helps to maintain safe conditions in the mines by withdrawing the potentially explosive methane gases.

In 2003, 17 companies produced gas from 1,225 conventional, 2,195 coalbed methane, and 14 dual completion wells (producing from both conventional gas reservoirs and coalbed methane reservoirs), with an estimated value of almost $404 million (using the natural gas nominal average wellhead price for 2003 from the EIA)(Figure 41). This accounted for approximately 19 percent of the value of total mineral production in Virginia. The major markets for natural gas are residential and commercial uses such as space heating, water heating and cooking, industrial uses such as process heating and chemical feedstock, and electric power generation. (Virginia Energy Patterns and Trends, 2004). Natural gas is

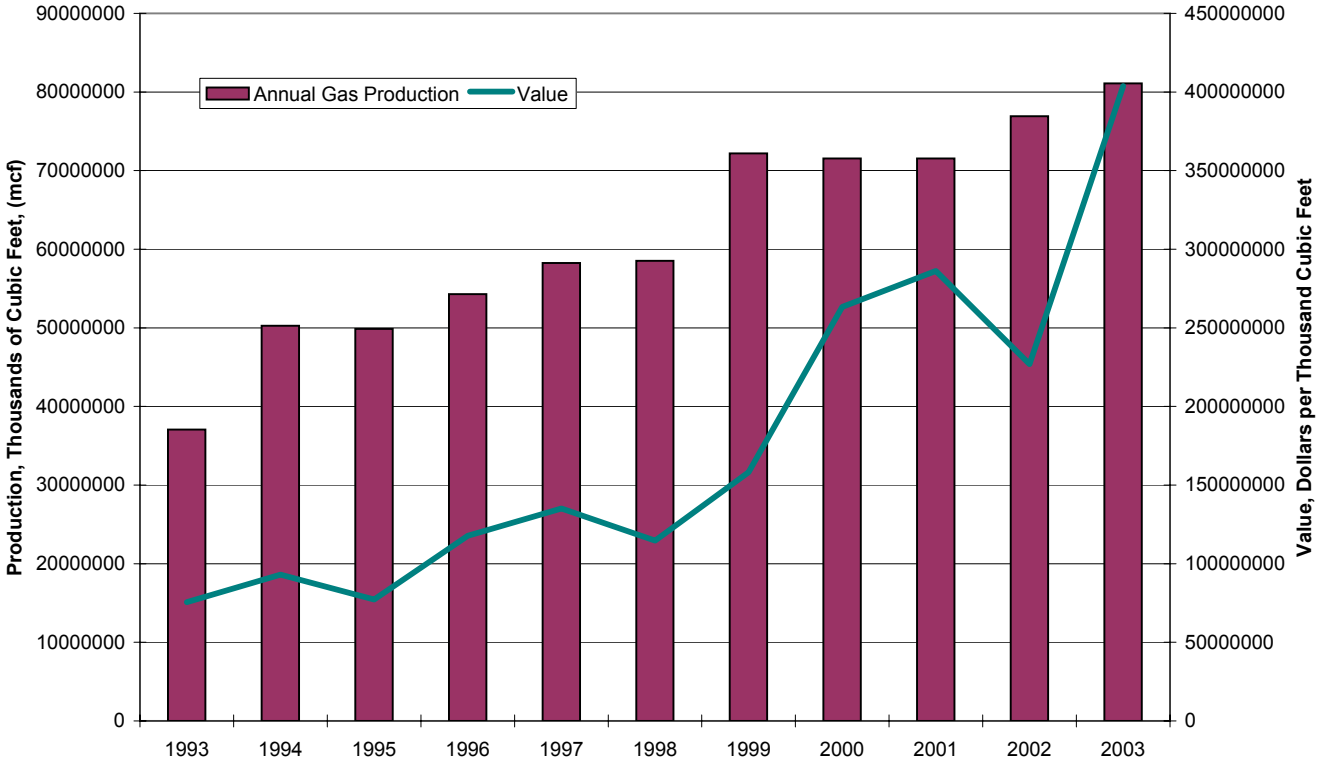


Figure 41. Natural gas production and value 1993-2003.

produced in Buchanan, Dickenson, Lee, Russell, Scott, Tazewell, and Wise counties (Figure 42 and Figure 43), with over 60 percent of the gas production coming from Buchanan County. Coalbed methane accounted for 91 percent of the gas produced in Buchanan County, and 77 percent of the gas produced in Virginia. In 2003, there was a record yearly total of 402 wells drilled in Virginia.

According to the EIA, Virginia ranked 20th among the states for natural gas production, and provided less than 1 percent of U.S. gas production in 2003 (EIA, Quick Stats, Top Natural Gas Producing States, 2003). A record total of 81 billion cubic feet (bcf) of natural gas was produced in Virginia in 2003. Gas production has experienced an upward trend since 1980, increasing 39 percent from 1999 to 2003 and 119 percent from 1994 to 2003. The increase was related to growth in coalbed methane production, which reached a record yearly total of 62.6 bcf in 2003. Most of the growth took place in Buchanan County, where gas production increased from 25.9 bcf in 1994 to 49.5 bcf in 2003 (Figure 44). Conventional gas production has declined 17 percent in the last nine years (Figure 45). Production volumes graphed with commodity price shows a general correlation between production and market price (Figure 46). Refer to Tables 23 through 27 in Appendix I for detailed production data for each of the years 1999 through 2003.

Conventional gas and coalbed methane are extracted by drilling wells into the formations that contain the gas, then creating pressure differentials that cause the gas to flow to the surface of the earth (Figure 47). From the well, the extracted gas is fed into a system of pipelines that transport the gas to facilities that process the raw gas into a marketable commodity. During processing, excess moisture and corrosive gas contaminants are removed (Virginia Energy Patterns and Trends, 2004).

After processing, Virginia's gas production is fed into the interstate pipeline network that traverses Virginia, as well as the in-state pipeline network. Because gas demand varies seasonally, there is a need for large capacity gas

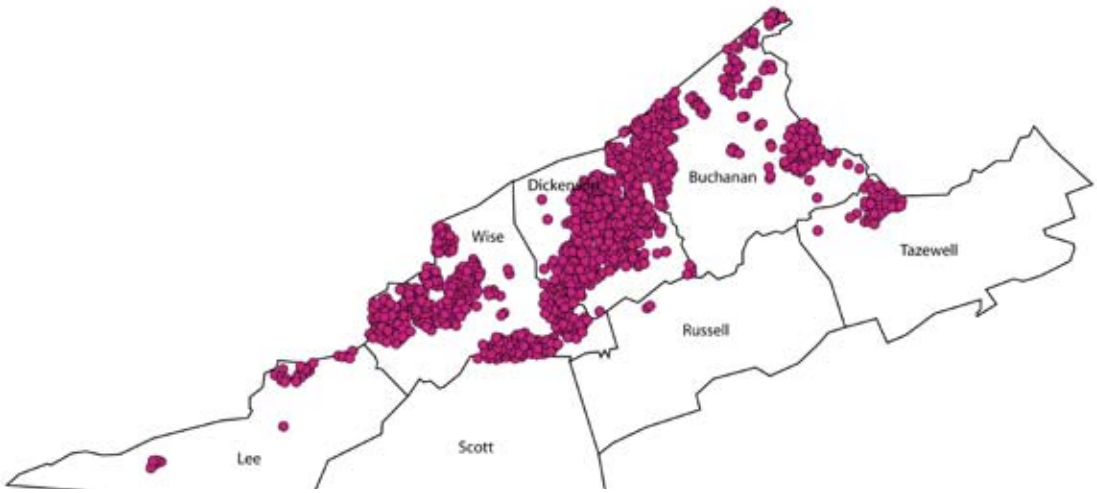


Figure 42. General locations of wells that produced conventional gas in 2003.

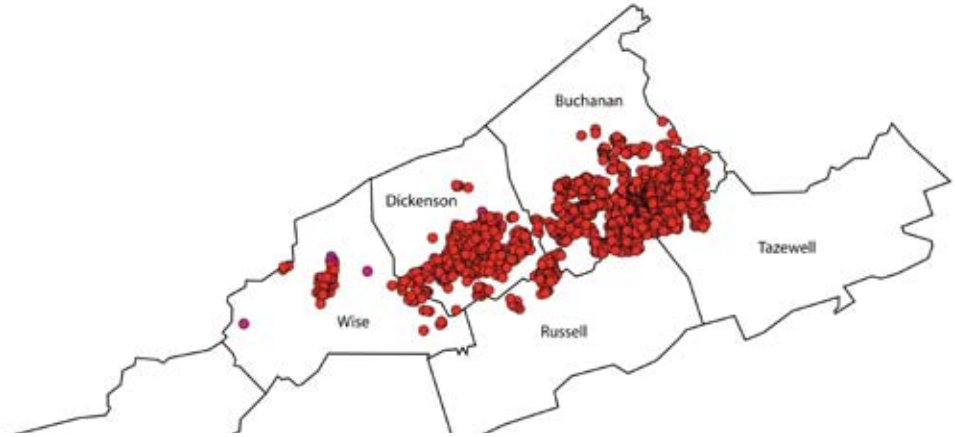


Figure 43. General locations of wells that produced coalbed methane in 2003.

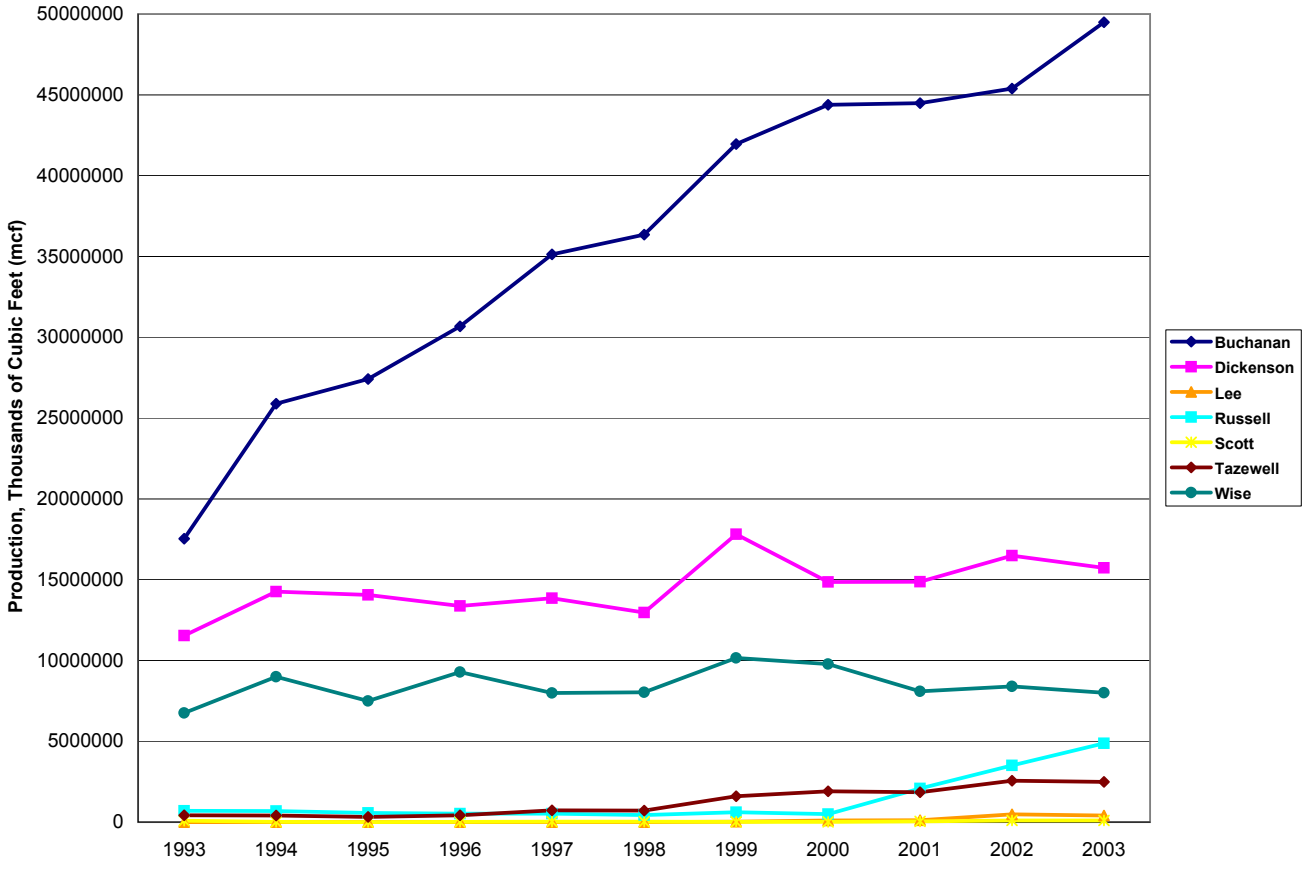


Figure 44. Natural Gas production by county, 1993-2003.

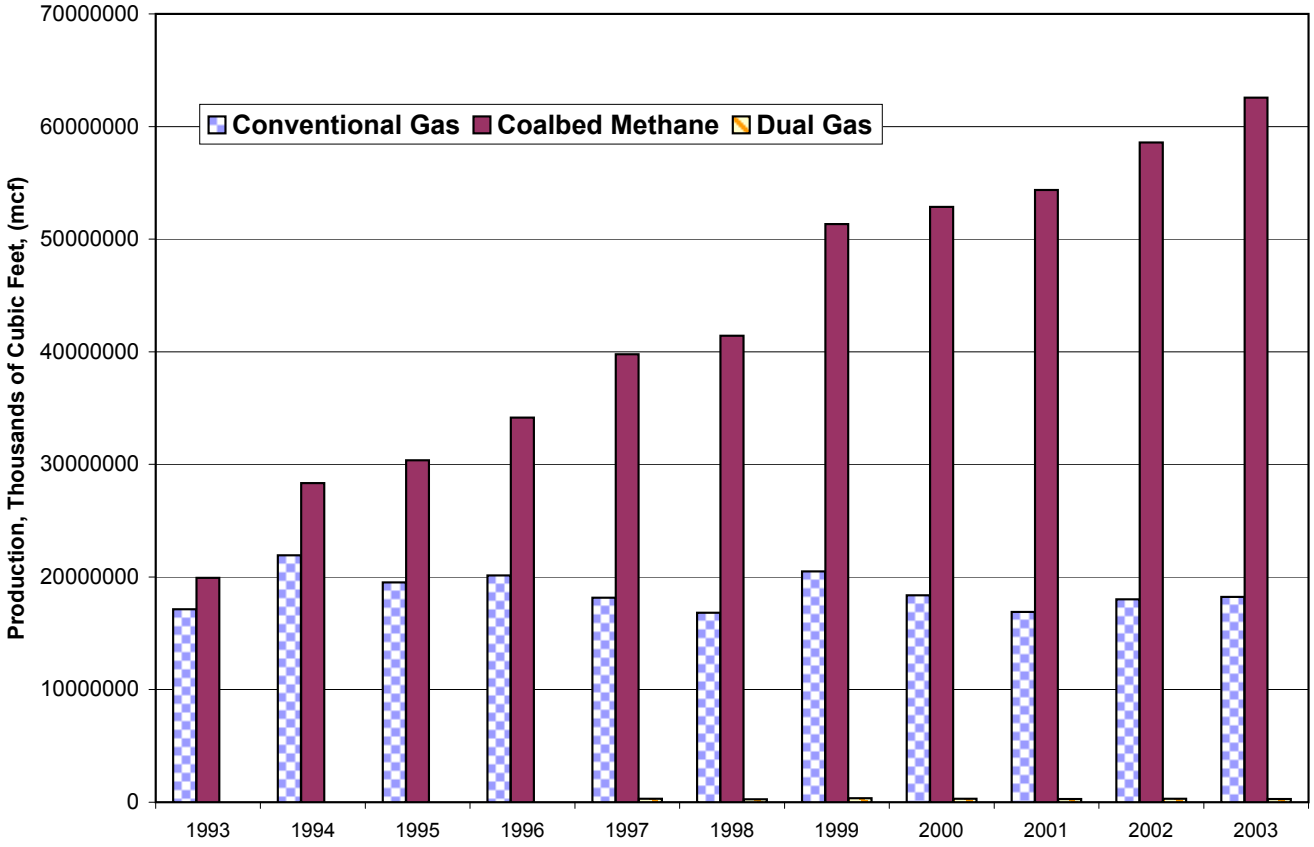


Figure 45. Natural Gas production by type, 1993-2003.

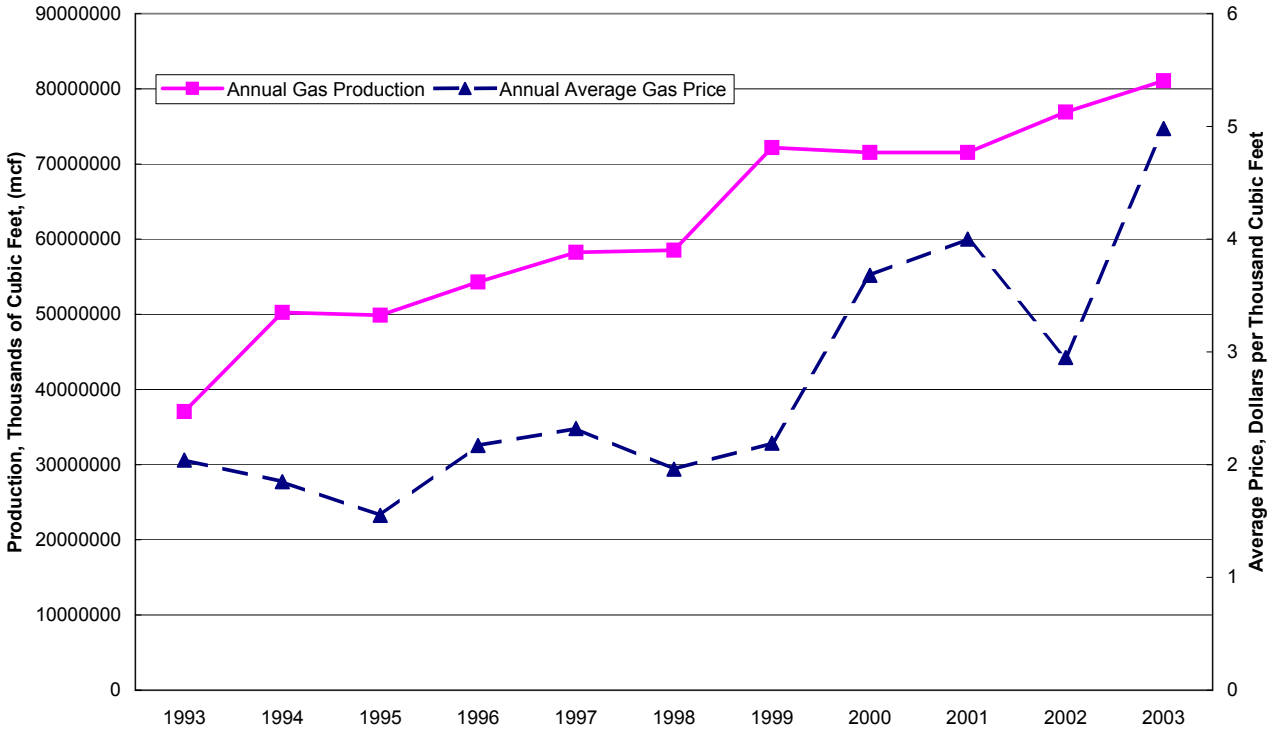


Figure 46. Natural Gas production and unit pricing, 1993-2003.

Figure 47. Pump jack installation on coalbed methane well operated by CNX Gas Company, LLC, in Buchanan County. Photograph provided by the Division of Gas and Oil.

storage. In Saltville, Smyth County, large underground cavities resulting from solution mining of the salt deposits are being developed into a major gas-storage facility. (Virginia Energy Patterns and Trends, 2004). Virginia Gas Company owns this underground salt cavity storage facility in Saltville, as well as a fractured sandstone formation that is used as a gas storage facility in Early Grove, Virginia. The combined storage capacity of these two facilities is 3 bcf of gas, with planned expansion to 9 bcf (Virginia Gas Company, 2005).

## Oil

The term "oil" includes crude petroleum and other hydrocarbons produced at the wellhead in liquid form, and the liquid hydrocarbons known as condensate recovered from natural gas. The molecular structure of hydrocarbons varies from the simplest, methane ($CH_4$) to the very heavy and complex. Octane, a constituent of crude oil, is one of the heavier, more complex molecules ($C_8H_{18}$).

Crude oil is produced in Lee and Wise counties in southwest Virginia (Figure 48). In 2003, APACO, Evan Energy, Pride Oil Company, and United Well Service produced oil from wells in Lee County. Equitable Production Company produced oil from wells that also produced natural gas in Lee and Wise counties. In 2003, there were

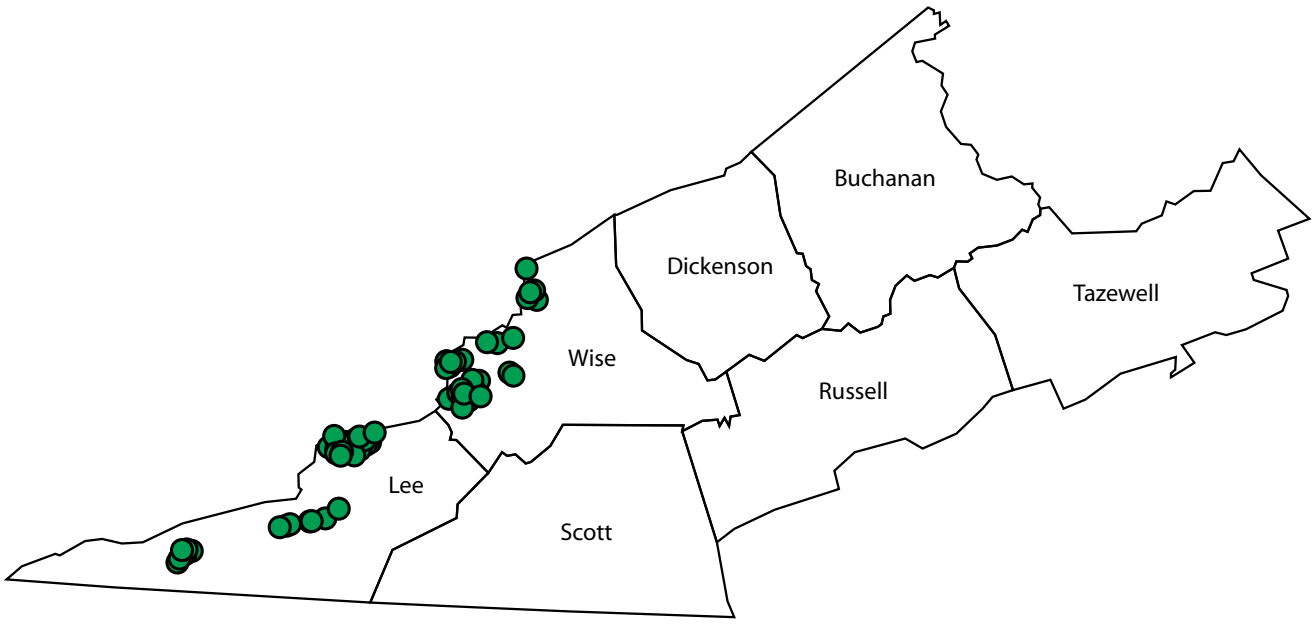


Figure 48. General locations of wells that produced oil in 2003.

7 producing oil wells, and 58 gas wells that also produced oil. According to the EIA, the major uses for petroleum products are motor gasoline (45 percent in 2003), distillate fuel oil, liquefied petroleum gases (such as propane), jet fuel, petrochemical feedstocks, kerosene, lubricants, waxes, and asphalt.

Most oil production is from the Ben Hur-Fleenortown and Rose Hill fields in Lee County. The oil is produced from several zones within the fractured Upper Ordovician Trenton Limestone, which is folded into an anticline under the Cumberland overthrust block. The Cumberland overthrust block moved northwestward along the Pine Mountain fault, and the Upper Cambrian through Middle Pennsylvanian rocks of the overthrust block have been folded into a northeast-trending feature called the Powell Valley anticline. The Cambrian through Devonian rocks in the underlying block are also folded into an anticline. The axis of the anticline in the stationary underlying block lies southeast of the axis of the Powell Valley anticline (Miller and Fuller, 1954). Fensters eroded through the overthrust block expose the rocks of the stationary underlying block. The successful oil wells have been drilled in these fenster areas into the Trenton Limestone, where the oil is trapped in fractures in the limestone. Oil from the Trenton Limestone is amber-colored and volatile, with a gravity of 43-48 degrees API (Harnsberger, 1955; Nolde, 1992).

A small amount of oil production also comes from the Reedsville Shale and Eggleston Limestone of Upper Ordovician age. These formations lie above and below, respectively, the Trenton Limestone in the stationary block underlying the Cumberland overthrust block. Exploration potential exists in the formations of the stationary block along the Powell Valley anticline where they are not exposed by fensters (Miller and Fuller, 1954).

In 2003, Virginia accounted for less than 1 percent of U.S. crude oil proved reserves, and ranked last in crude oil production, accounting for less than 1 percent of U.S. production. There were 18,489 barrels of crude oil produced in Virginia, with an estimated value of over half a million dollars (using EIA's U.S. average nominal first purchase price for crude oil in 2003)(Figure 49). Annual oil production in Virginia reached its peak in 1983 at 65,400 barrels. It has declined since then, reaching an annual low of 8,804 barrels in 1999. Between 1999 and 2002, annual production increased 185 percent, to a high of 25,110 barrels. The increase in production in 2002 was related to production completions in several gas wells that were also capable of producing oil, but were classified as gas wells because of their high gas to oil production ratio. In 2003, there was a decline in production of 26 percent or 6,621 barrels. Production volumes graphed with commodity price shows a general correlation between production and market price (Figure 50). Refer to Tables 23 through 27 in Appendix I for detailed production data for each of the years 1999 through 2003.

Because petroleum volumes produced from individual wells in Virginia are small, collection tanks are located at each wellhead. Collection trucks visit each wellhead tank periodically, transporting the collected crude to a central location (Virginia Energy Patterns and Trends, 2004). From there it is shipped via railroad to a refinery near Charleston, West Virginia.

In Virginia, there is one oil refinery at Yorktown, with the capacity to refine 58,600 barrels of crude oil per calendar day (EIA, Petroleum, State Data, Virginia, 2004). This refinery processes oil from outside of Virginia. Refining separates liquid hydrocarbons into specific crude "fractions." Crude oil is heated and injected at the base of a "distillation tower." As the vapors rise up the tower, they encounter progressively cooler temperatures. Various molecular components condense and are collected at specific points within the tower. Heavier components (such as fuel oil) condense at relatively high temperatures, while lower molecular weight compounds (such as gasoline and aviation fuels) are able to rise higher in the tower before condensing (Virginia Energy Patterns and Trends, "Petroleum", 2004).

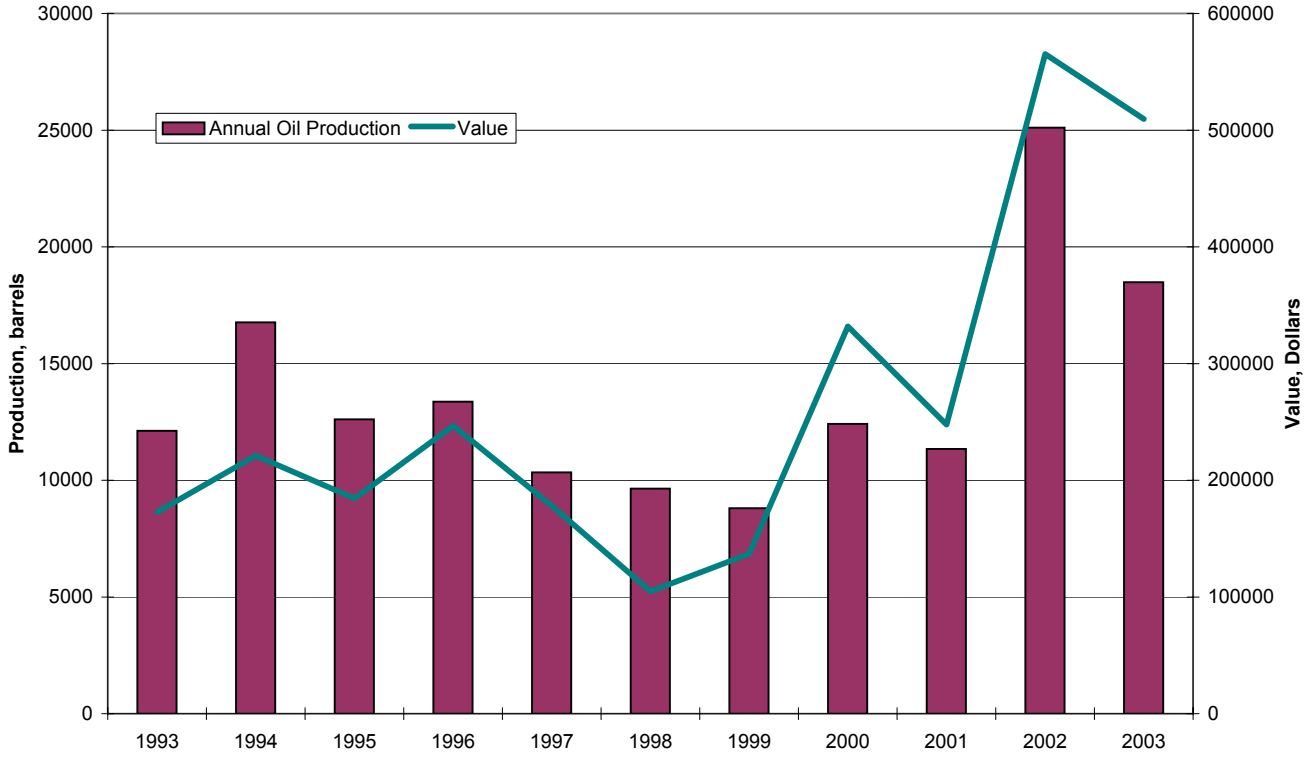


Figure 49. Oil production and value 1993-2003.

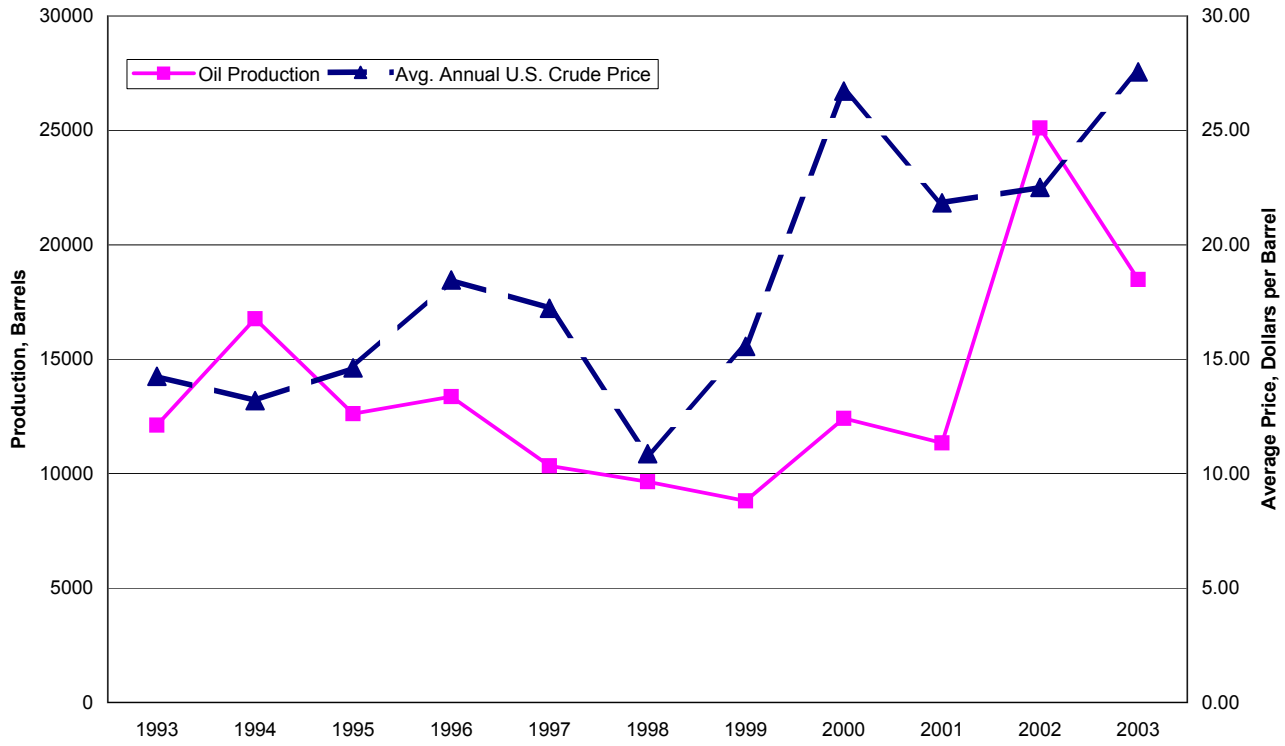


Figure 50. Oil production and unit pricing, 1993-2003.

## CREDITS AND DATA SOURCES

Graphs provided within the text are designed only to show trends in value and production of commodities and should not be used to obtain exact values for sales or production. Values used to generate the graphs may be obtained from the Division of Mineral Resources at 434-951-6368. Data used to create the included graphs and tables were obtained from the Division of Mineral Mining (DMM), 900 Natural Resources Drive, Charlottesville, Virginia, 22903; Division of Mines (DM), 3405 Mountain Empire Road, Big Stone Gap, Virginia, 24219; and Division of Gas & Oil (DGO), 230 Charwood Drive, Abingdon, Virginia, 24210.

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Table 1a. Production of basalt, clay, diabase, diorite, dolostone, feldspar, fullers earth, granite, gravel, greenstone, and gypsum by county, 1999.

| County/City | Basalt and Traprock | Clay | Diabase | Diorite | Dolostone | Feldspar | Fullers Earth | Granite | Gravel | Greenstone | Gypsum |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Albemarle | 866,800 | 0 | 0 | 0 | 0 | 0 | 0 | 411,000 | 0 | 0 | 0 |
| Amherst | 0 | 69,821 | 0 | 0 | 0 | 433,671 | 0 | 0 | 0 | 0 | 0 |
| Botetourt | 0 | 189,300 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brunswick | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,090,801 | 0 | 0 | 0 |
| Campbell | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 452,748 | 0 |
| Caroline | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chesterfield | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,969,126 | 0 | 0 | 0 |
| Culpeper | 0 | 0 | 321,462 | 0 | 0 | 0 | 0 | 3,841 | 0 | 0 | 0 |
| Dinwiddie | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,537,400 | 0 | 0 | 0 |
| Fairfax | 2,214,267 | 0 | 0 | 0 | 0 | 0 | 0 | 1,718,822 | 0 | 0 | 0 |
| Fauquier | 825,552 | 0 | 0 | 0 | 0 | 0 | 0 | 788,832 | 0 | 0 | 0 |
| Floyd | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29,930 | 0 |
| Franklin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 339,080 | 0 | 0 | 0 |
| Goochland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4,395,672 | 0 | 0 | 0 |
| Grayson | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 568,980 | 0 | 0 | 0 |
| Greene | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 710,254 | 0 | 0 | 0 |
| Greensville | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,731,524 | 0 | 0 | 0 |
| Hanover | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,174,107 | 124,896 | 0 | 0 |
| Henrico | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,200,095 | 3,034 | 0 | 0 |
| Henry | 0 | 0 | 0 | 187,649 | 0 | 0 | 0 | 961,964 | 0 | 0 | 0 |
| Isle of Wight | 0 | 13,159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| King and Queen | 0 | 0 | 0 | 0 | 0 | 0 | 50,886 | 0 | 0 | 0 | 0 |
| King William | 0 | 174,481 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Loudoun | 8,519,443 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Louisa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 344,560 | 0 | 0 | 0 |
| Mecklenburg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 985,141 | 0 | 0 | 0 |
| Northumberland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,900 | 0 | 0 |
| Nottoway | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 563,874 | 0 | 0 | 0 |
| Powhatan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 946,252 | 0 | 0 | 0 |
| Prince George | 0 | 99,340 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Prince William | 2,899,311 | 102,212 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Richmond (City) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,116,723 | 0 | 0 | 0 |
| Rockingham | 0 | 50,585 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Smyth | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 303,734 |
| Spotsylvania | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,074,129 | 27,200 | 0 | 0 |
| Stafford | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,645,156 | 0 | 0 | 0 |
| Warren | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18,833 | 0 | 0 |
| **Total** | **15,325,373** | **698,898** | **321,462** | **187,649** | **0** | **433,671** | **50,886** | **29,277,333** | **175,863** | **482,678** | **303,734** |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mineral Mining)

Table 1b. Production of iron oxide pigment, kyanite, limestone, quartzite, sand, sand and gravel, sandstone, shale, slate, titanium, and vermiculite by county, 1999.

| County/City | Iron Oxide Pigment | Kyanite | Limestone | Quartzite | Sand | Sand and Gravel | Sandstone | Shale | Slate | Titanium | Vermiculite |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Accomack | 0 | 0 | 0 | 0 | 77,278 | 0 | 0 | 0 | 0 | 0 | 0 |
| Albemarle | 0 | 0 | 0 | 0 | 900 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alleghany | 0 | 0 | 25,122 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Amelia | 0 | 0 | 0 | 0 | 0 | 116,033 | 0 | 0 | 0 | 0 | 0 |
| Amherst | 0 | 0 | 0 | 0 | 2,184 | 0 | 0 | 0 | 0 | 0 | 0 |
| Appomattox | 0 | 0 | 299,560 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Augusta | 0 | 0 | 843,016 | 0 | 74,630 | 69,895 | 212,964 | 0 | 0 | 0 | 0 |
| Bath | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,225 | 0 | 0 | 0 |
| Bedford | 0 | 0 | 945,768 | 0 | 5,587 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bland | 0 | 0 | 254,987 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Botetourt | 0 | 0 | 2,250,879 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brunswick | 0 | 0 | 0 | 0 | 3,615 | 0 | 0 | 96,320 | 0 | 0 | 0 |
| Buckingham | 0 | 694,715 | 0 | 0 | 0 | 0 | 0 | 0 | 435,379 | 0 | 0 |
| Campbell | 0 | 0 | 1,382,763 | 0 | 12,951 | 0 | 300 | 0 | 0 | 0 | 0 |
| Caroline | 0 | 0 | 0 | 0 | 0 | 315,557 | 0 | 0 | 0 | 0 | 0 |
| Carroll | 0 | 0 | 134,946 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Charles City | 0 | 0 | 0 | 0 | 6 | 945,364 | 0 | 0 | 0 | 0 | 0 |
| Charlotte | 0 | 0 | 0 | 0 | 19,267 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chesapeake(City) | 0 | 0 | 0 | 0 | 490,139 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chesterfield | 0 | 0 | 0 | 0 | 3,600 | 0 | 0 | 0 | 0 | 0 | 0 |
| Clarke | 0 | 0 | 196,427 | 0 | 0 | 0 | 0 | 3,500 | 0 | 0 | 0 |
| Craig | 0 | 0 | 0 | 0 | 160,752 | 0 | 0 | 0 | 0 | 0 | 0 |
| Culpeper | 0 | 0 | 0 | 0 | 0 | 0 | 461,515 | 0 | 0 | 0 | 0 |
| Danville(City) | 0 | 0 | 0 | 0 | 4,974 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dinwiddie | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 150240 | 0 |
| Essex | 0 | 0 | 0 | 0 | 3,016 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fauquier | 0 | 0 | 0 | 0 | 0 | 0 | 58 | 0 | 0 | 0 | 0 |
| Fluvanna | 0 | 0 | 0 | 0 | 9,807 | 0 | 0 | 0 | 0 | 0 | 0 |
| Frederick | 0 | 0 | 1,834,005 | 439,009 | 1,672 | 0 | 0 | 15,591 | 0 | 0 | 0 |
| Giles | 0 | 0 | 1,153,654 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gloucester | 0 | 0 | 0 | 0 | 49,070 | 267,549 | 0 | 0 | 0 | 0 | 0 |
| Grayson | 0 | 0 | 0 | 0 | 5,085 | 0 | 0 | 0 | 0 | 0 | 0 |
| Greensville | 0 | 0 | 0 | 0 | 0 | 280,013 | 0 | 96,320 | 0 | 0 | 0 |

Table 1b (cont.). Production of iron oxide pigment, kyanite, limestone, quartzite, sand, sand and gravel, sandstone, shale, slate, titanium, and vermiculite by county, 1999.

| County/City | Iron Oxide Pigment | Kyanite | Limestone | Quartzite | Sand | Sand and Gravel | Sandstone | Shale | Slate | Titanium | Vermiculite |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Halifax | 0 | 0 | 0 | 0 | 775,424 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hampton(City) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hanover | 0 | 0 | 0 | 0 | 190,659 | 81,885 | 0 | 0 | 0 | 0 | 0 |
| Henrico | 0 | 0 | 0 | 0 | 7,788 | 1,652,296 | 0 | 0 | 0 | 0 | 0 |
| Henry | 0 | 0 | 0 | 0 | 3,606 | 0 | 0 | 0 | 0 | 0 | 0 |
| Highland | 0 | 0 | 59,160 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Isle of Wight | 0 | 0 | 0 | 0 | 1,091,028 | 0 | 0 | 0 | 0 | 0 | 0 |
| James City | 0 | 0 | 0 | 0 | 329,987 | 0 | 0 | 0 | 0 | 0 | 0 |
| King and Queen | 0 | 0 | 0 | 0 | 55,075 | 27,028 | 0 | 0 | 0 | 0 | 0 |
| King George | 0 | 0 | 0 | 0 | 0 | 1,680,056 | 0 | 0 | 0 | 0 | 0 |
| King William | 0 | 0 | 0 | 0 | 996 | 1,017,874 | 0 | 0 | 0 | 0 | 0 |
| Lancaster | 0 | 0 | 0 | 0 | 12,305 | 21,021 | 0 | 0 | 0 | 0 | 0 |
| Lee | 0 | 0 | 912,693 | 0 | 0 | 0 | 11,300 | 0 | 0 | 0 | 0 |
| Louisa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 48,265 |
| Mathews | 0 | 0 | 0 | 0 | 9,400 | 18,791 | 0 | 0 | 0 | 0 | 0 |
| Mecklenburg | 0 | 0 | 0 | 0 | 1,765 | 0 | 0 | 0 | 0 | 0 | 0 |
| Middlesex | 0 | 0 | 0 | 0 | 109,814 | 0 | 0 | 0 | 0 | 0 | 0 |
| Montgomery | 0 | 0 | 2,061,033 | 0 | 0 | 0 | 0 | 9,824 | 0 | 0 | 0 |
| Nelson | 0 | 0 | 0 | 0 | 0 | 1,831 | 0 | 0 | 0 | 0 | 0 |
| New Kent | 0 | 0 | 0 | 0 | 0 | 14,469 | 0 | 0 | 0 | 0 | 0 |
| Northampton | 0 | 0 | 0 | 0 | 31,420 | 0 | 0 | 0 | 0 | 0 | 0 |
| Northumberland | 0 | 0 | 0 | 0 | 5,954 | 3,654 | 0 | 0 | 0 | 0 | 0 |
| Orange | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 136,982 | 0 | 0 | 0 |
| Page | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 700 | 0 | 0 | 0 |
| Pittsylvania | 0 | 0 | 0 | 0 | 61,748 | 0 | 0 | 0 | 360,629 | 0 | 0 |
| Prince George | 0 | 0 | 0 | 0 | 55,323 | 1,216,100 | 0 | 0 | 0 | 0 | 0 |
| Pulaski | 580 | 0 | 550,177 | 0 | 0 | 0 | 0 | 5,328 | 0 | 0 | 0 |
| Richmond | 0 | 0 | 0 | 0 | 5,338 | 0 | 0 | 0 | 0 | 0 | 0 |
| Roanoke | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 85,948 | 0 | 0 | 0 |
| Rockbridge | 0 | 0 | 272,892 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rockingham | 0 | 0 | 1,484,854 | 0 | 0 | 248,056 | 0 | 42,960 | 0 | 0 | 0 |
| Russell | 0 | 0 | 1,651,143 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scott | 0 | 0 | 593,439 | 0 | 0 | 0 | 0 | 124,158 | 0 | 0 | 0 |
| Shenandoah | 0 | 0 | 1,843,200 | 0 | 600 | 0 | 0 | 2,100 | 0 | 0 | 0 |

Table 1b (cont.). Production of iron oxide pigment, kyanite, limestone, quartzite, sand, sand and gravel, sandstone, shale, slate, titanium, and vermiculite by county, 1999.

| County/City | Iron Oxide Pigment | Kyanite | Limestone | Quartzite | Sand | Sand and Gravel | Sandstone | Shale | Slate | Titanium | Vermiculite |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Smyth | 0 | 0 | 43,334 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Southampton | 0 | 0 | 0 | 0 | 198,334 | 100,350 | 0 | 0 | 0 | 0 | 0 |
| Spotsylvania | 0 | 0 | 0 | 0 | 0 | 651,700 | 0 | 0 | 0 | 0 | 0 |
| Stafford | 0 | 0 | 0 | 0 | 0 | 739,383 | 0 | 0 | 0 | 0 | 0 |
| Suffolk(City) | 0 | 0 | 0 | 0 | 110,825 | 81,260 | 0 | 0 | 0 | 0 | 0 |
| Surry | 0 | 0 | 0 | 0 | 30 | 3,305 | 0 | 0 | 0 | 0 | 0 |
| Sussex | 0 | 0 | 0 | 0 | 4,380 | 92,578 | 0 | 0 | 0 | 0 | 0 |
| Tazewell | 0 | 0 | 1,497,486 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Virginia Beach (City) | 0 | 0 | 0 | 0 | 1,229,518 | 0 | 0 | 0 | 0 | 0 | 0 |
| Warren | 0 | 0 | 395,051 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Washington | 0 | 0 | 966,781 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Westmoreland | 0 | 0 | 0 | 0 | 126,269 | 4,112 | 0 | 0 | 0 | 0 | 0 |
| Wise | 0 | 0 | 563,636 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wythe | 117 | 0 | 683,330 | 638,482 | 175,943 | 0 | 211,931 | 161,714 | 0 | 0 | 0 |
| York | 0 | 0 | 0 | 0 | 2,211 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **697** | **694,715** | **22,899,336** | **1,077,491** | **5,520,273** | **9,650,160** | **898,068** | **783,670** | **796,008** | **150,240** | **48,265** |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mineral Mining)

Table 2a. Production of basalt, clay, diabase, diorite, dolostone, feldspar, fullers earth, granite, gravel, greenstone, and gypsum by county, 2000.

| County/City | Basalt and Traprock | Clay | Diabase | Diorite | Dolostone | Feldspar | Fullers Earth | Granite | Gravel | Greenstone | Gypsum |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Albemarle | 845,311 | 0 | 0 | 0 | 0 | 0 | 0 | 345,793 | 0 | 0 | 0 |
| Amherst | 0 | 63,123 | 0 | 0 | 0 | 436,646 | 0 | 0 | 0 | 0 | 0 |
| Botetourt | 0 | 241,242 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brunswick | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,065,464 | 0 | 0 | 0 |
| Campbell | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 508,124 | 0 |
| Caroline | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 200 | 0 | 0 | 0 |
| Chesterfield | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,863,939 | 0 | 0 | 0 |
| Culpeper | 0 | 0 | 450,856 | 0 | 0 | 0 | 0 | 6,529 | 0 | 0 | 0 |
| Dinwiddie | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,366,468 | 0 | 0 | 0 |
| Fairfax | 2,238,753 | 0 | 0 | 0 | 0 | 0 | 0 | 2,339,948 | 0 | 0 | 0 |
| Fauquier | 917,226 | 0 | 0 | 0 | 0 | 0 | 0 | 875,822 | 0 | 0 | 0 |
| Floyd | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 70,789 | 0 |
| Franklin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 428,896 | 0 | 0 | 0 |
| Goochland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4,519,794 | 0 | 0 | 0 |
| Grayson | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 818,521 | 0 | 0 | 0 |
| Greene | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 759,958 | 0 | 0 | 0 |
| Greensville | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,811,021 | 0 | 0 | 0 |
| Hanover | 0 | 22,750 | 0 | 0 | 0 | 0 | 0 | 2,184,476 | 0 | 0 | 0 |
| Henrico | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,074,491 | 6,760 | 0 | 0 |
| Henry | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,238,052 | 0 | 0 | 0 |
| Isle of Wight | 0 | 9,442 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| King and Queen | 0 | 0 | 0 | 0 | 0 | 0 | 51,533 | 0 | 0 | 0 | 0 |
| King William | 0 | 177,263 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Loudoun | 9,128,685 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Louisa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 380,423 | 0 | 0 | 0 |
| Mecklenburg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 825,335 | 0 | 0 | 0 |
| Northumberland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 650 | 0 | 0 |
| Nottoway | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 536,077 | 0 | 0 | 0 |
| Powhatan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 911,291 | 0 | 0 | 0 |
| Prince George | 0 | 40,300 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Prince William | 3,654,274 | 102,549 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Richmond (City) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,115,274 | 0 | 0 | 0 |
| Rockingham | 0 | 44,641 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Smyth | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spotsylvania | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,036,877 | 6,510 | 0 | 0 |
| Stafford | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,618,683 | 0 | 0 | 0 |
| Warren | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18,928 | 0 | 0 |
| **Total** | **16,784,249** | **701,310** | **450,856** | **0** | **0** | **436,646** | **51,533** | **30,123,333** | **32,848** | **578,913** | **0** |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mineral Mining)

Table 2b. Production of iron oxide pigment, kyanite, limestone, quartzite, sand, sand and gravel, sandstone, shale, slate, titanium, and vermiculite by county, 2000.

| County/City | Iron Oxide Pigment | Kyanite | Limestone | Quartzite | Salt | Sand | Sand and Clay | Sand and Gravel | Sandstone | Shale | Slate | Titanium | Vermiculite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accomack | 0 | 0 | 0 | 0 | 0 | 118,434 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Albemarle | 0 | 0 | 0 | 0 | 0 | 200 | 0 | 200 | 0 | 0 | 0 | 0 | 0 |
| Alleghany | 0 | 0 | 240,917 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Amelia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 163,100 | 0 | 0 | 0 | 0 | 0 |
| Amherst | 0 | 0 | 0 | 0 | 0 | 3,832 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Appomattox | 0 | 0 | 266,652 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Augusta | 0 | 0 | 921,986 | 0 | 0 | 44,846 | 0 | 115,790 | 187,601 | 0 | 0 | 0 | 0 |
| Bath | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,150 | 0 | 0 | 0 |
| Bedford | 0 | 0 | 1,046,909 | 467 | 0 | 15,580 | 0 | 5,415 | 0 | 0 | 0 | 0 | 0 |
| Bland | 0 | 0 | 265,725 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Botetourt | 0 | 0 | 2,441,425 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brunswick | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 98,982 | 0 | 0 | 0 |
| Buckingham | 0 | 671,455 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 318,790 | 0 | 0 |
| Campbell | 0 | 0 | 1,437,474 | 0 | 0 | 17,051 | 0 | 0 | 400 | 0 | 0 | 0 | 0 |
| Caroline | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 256,535 | 0 | 0 | 0 | 0 | 0 |
| Carroll | 0 | 0 | 118,979 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Charles City | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 902,909 | 0 | 0 | 0 | 0 | 0 |
| Charlotte | 0 | 0 | 0 | 0 | 0 | 15,632 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chesapeake(City) | 0 | 0 | 0 | 0 | 0 | 461,404 | 123,137 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chesterfield | 0 | 0 | 0 | 0 | 0 | 0 | 34,986 | 0 | 0 | 0 | 0 | 0 | 0 |
| Clarke | 0 | 0 | 175,069 | 0 | 0 | 0 | 0 | 0 | 0 | 342 | 0 | 0 | 0 |
| Craig | 0 | 0 | 0 | 0 | 0 | 174,307 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Culpeper | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 383,501 | 0 | 0 | 0 | 0 |
| Danville(City) | 0 | 0 | 0 | 0 | 0 | 6,789 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dinwiddie | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 195692 | 0 |
| Essex | 0 | 0 | 0 | 0 | 0 | 11,016 | 0 | 300 | 0 | 0 | 0 | 0 | 0 |
| Fauquier | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 0 | 0 | 0 | 0 |
| Fluvanna | 0 | 0 | 0 | 0 | 0 | 7,344 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Frederick | 0 | 0 | 1,655,242 | 431,012 | 0 | 1,463 | 0 | 0 | 0 | 15,813 | 0 | 0 | 0 |
| Giles | 0 | 0 | 796,710 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gloucester | 0 | 0 | 0 | 0 | 0 | 18,926 | 0 | 234,162 | 0 | 0 | 0 | 0 | 0 |
| Grayson | 0 | 0 | 0 | 0 | 0 | 8,525 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Greensville | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 267,664 | 0 | 98,982 | 0 | 0 | 0 |

Table 2b (cont.). Production of iron oxide pigment, kyanite, limestone, quartzite, sand, sand and gravel, sandstone, shale, slate, titanium, and vermiculite by county, 2000.

| County/City | Iron Oxide Pigment | Kyanite | Limestone | Quartzite | Salt | Sand | Sand and Clay | Sand and Gravel | Sandstone | Shale | Slate | Titanium | Vermiculite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Halifax | 0 | 0 | 0 | 0 | 0 | 918,478 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hampton(City) | 0 | 0 | 0 | 0 | 0 | 78,098 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hanover | 0 | 0 | 0 | 0 | 0 | 205,205 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Henrico | 0 | 0 | 0 | 0 | 0 | 11,130 | 0 | 1,836,750 | 0 | 0 | 0 | 0 | 0 |
| Henry | 0 | 0 | 0 | 0 | 0 | 3,008 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Highland | 0 | 0 | 76,276 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Isle of Wight | 0 | 0 | 0 | 0 | 0 | 1,290,228 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| James City | 0 | 0 | 0 | 0 | 0 | 242,654 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| King and Queen | 0 | 0 | 0 | 0 | 0 | 58,901 | 0 | 23,000 | 0 | 0 | 0 | 0 | 0 |
| King George | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,115,465 | 0 | 0 | 0 | 0 | 0 |
| King William | 0 | 0 | 0 | 0 | 0 | 887 | 0 | 928,847 | 0 | 0 | 0 | 0 | 0 |
| Lancaster | 0 | 0 | 0 | 0 | 0 | 15,210 | 0 | 23,619 | 0 | 0 | 0 | 0 | 0 |
| Lee | 0 | 0 | 789,434 | 0 | 0 | 0 | 0 | 0 | 11,800 | 0 | 0 | 0 | 0 |
| Louisa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 45,971 |
| Mathews | 0 | 0 | 0 | 0 | 0 | 3,900 | 200 | 47,076 | 0 | 0 | 0 | 0 | 0 |
| Mecklenburg | 0 | 0 | 0 | 0 | 0 | 12,562 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Middlesex | 0 | 0 | 0 | 0 | 0 | 93,561 | 4,000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Montgomery | 0 | 0 | 2,118,728 | 0 | 0 | 0 | 0 | 0 | 0 | 11,955 | 0 | 0 | 0 |
| Nelson | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| New Kent | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 39,320 | 0 | 0 | 0 | 0 | 0 |
| Northampton | 0 | 0 | 0 | 0 | 0 | 8,360 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Northumberland | 0 | 0 | 0 | 0 | 0 | 12,903 | 0 | 4,463 | 0 | 0 | 0 | 0 | 0 |
| Orange | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 141,586 | 0 | 0 | 0 |
| Page | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 600 | 0 | 0 | 0 |
| Pittsylvania | 0 | 0 | 0 | 0 | 0 | 39,130 | 0 | 0 | 0 | 0 | 308,288 | 0 | 0 |
| Prince George | 0 | 0 | 0 | 0 | 0 | 60,959 | 0 | 1,186,816 | 0 | 0 | 0 | 0 | 0 |
| Pulaski | 205 | 0 | 576,301 | 0 | 0 | 0 | 0 | 0 | 0 | 12,132 | 0 | 0 | 0 |
| Richmond | 0 | 0 | 0 | 0 | 0 | 4,528 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Roanoke | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 73,456 | 0 | 0 | 0 |
| Rockbridge | 0 | 0 | 273,549 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rockingham | 0 | 0 | 1,461,008 | 0 | 0 | 0 | 0 | 332,322 | 0 | 52,617 | 0 | 0 | 0 |
| Russell | 0 | 0 | 1,439,094 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scott | 0 | 0 | 407,662 | 0 | 0 | 0 | 0 | 0 | 0 | 134,506 | 0 | 0 | 0 |
| Shenandoah | 0 | 0 | 2,051,826 | 0 | 0 | 750 | 0 | 0 | 0 | 1,200 | 0 | 0 | 0 |

Table 2b (cont.). Production of iron oxide pigment, kyanite, limestone, quartzite, sand, sand and gravel, sandstone, shale, slate, titanium, and vermiculite by county, 2000.

| County/City | Iron Oxide Pigment | Kyanite | Limestone | Quartzite | Salt | Sand | Sand and Clay | Sand and Gravel | Sandstone | Shale | Slate | Titanium | Vermiculite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Smyth | 0 | 0 | 172,272 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Southampton | 0 | 0 | 0 | 0 | 0 | 169,030 | 0 | 75,024 | 0 | 0 | 0 | 0 | 0 |
| Spotsylvania | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 675,305 | 0 | 0 | 0 | 0 | 0 |
| Stafford | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 359,863 | 0 | 0 | 0 | 0 | 0 |
| Suffolk(City) | 0 | 0 | 0 | 0 | 0 | 811,403 | 0 | 63,373 | 0 | 0 | 0 | 0 | 0 |
| Surry | 0 | 0 | 0 | 0 | 0 | 1,770 | 0 | 6,603 | 0 | 0 | 0 | 0 | 0 |
| Sussex | 0 | 0 | 0 | 0 | 0 | 21,720 | 0 | 102,413 | 0 | 0 | 0 | 0 | 0 |
| Tazewell | 0 | 0 | 1,206,311 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Virginia Beach (City) | 0 | 0 | 0 | 0 | 0 | 1,518,528 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Warren | 0 | 0 | 378,897 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Washington | 0 | 0 | 981,391 | 0 | 3,010 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Westmoreland | 0 | 0 | 0 | 0 | 0 | 109,780 | 0 | 4,468 | 0 | 0 | 0 | 0 | 0 |
| Wise | 0 | 0 | 339,116 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wythe | 616 | 0 | 296,299 | 806,439 | 0 | 185,610 | 0 | 0 | 243,920 | 179,872 | 0 | 0 | 0 |
| York | 0 | 0 | 0 | 0 | 0 | 2,595 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **821** | **671,455** | **21,935,252** | **1,237,918** | **3,010** | **6,786,236** | **162,323** | **9,770,803** | **827,472** | **823,193** | **627,078** | **195,692** | **45,971** |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mineral Mining)

Table 3a. Production of basalt, clay, diabase, diorite, dolostone, feldspar, fullers earth, granite, gravel, greenstone, and gypsum by county, 2001.

| County/City | Basalt and Traprock | Clay | Diabase | Diorite | Dolostone | Feldspar | Fullers Earth | Granite | Gravel | Greenstone | Gypsum |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Albemarle | 823,466 | 0 | 0 | 0 | 0 | 0 | 0 | 448,960 | 0 | 0 | 0 |
| Amherst | 0 | 51,365 | 0 | 0 | 0 | 431,028 | 0 | 0 | 0 | 0 | 0 |
| Botetourt | 0 | 208,818 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brunswick | 0 | 160 | 0 | 0 | 0 | 0 | 0 | 2,337,919 | 0 | 0 | 0 |
| Campbell | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 435,244 | 0 |
| Caroline | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chesterfield | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,763,332 | 0 | 0 | 0 |
| Culpeper | 0 | 0 | 550,472 | 0 | 0 | 0 | 0 | 14,849 | 0 | 0 | 0 |
| Dinwiddie | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 941,749 | 0 | 0 | 0 |
| Fairfax | 2,499,579 | 0 | 0 | 0 | 0 | 0 | 0 | 2,966,623 | 0 | 0 | 0 |
| Fauquier | 1,036,271 | 0 | 0 | 0 | 0 | 0 | 0 | 1,017,047 | 0 | 0 | 0 |
| Floyd | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 66,213 | 0 |
| Franklin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 288,253 | 0 | 0 | 0 |
| Goochland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,114,916 | 0 | 0 | 0 |
| Grayson | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 676,266 | 0 | 0 | 0 |
| Greene | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 716,508 | 0 | 0 | 0 |
| Greensville | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,830,538 | 0 | 0 | 0 |
| Hanover | 0 | 51,854 | 0 | 0 | 0 | 0 | 0 | 2,323,775 | 17,459 | 0 | 0 |
| Henrico | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,238,379 | 4,020 | 0 | 0 |
| Henry | 0 | 0 | 0 | 100 | 0 | 0 | 0 | 1,027,887 | 0 | 0 | 0 |
| Isle of Wight | 0 | 159,341 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| King and Queen | 0 | 0 | 0 | 0 | 0 | 0 | 50,016 | 0 | 0 | 0 | 0 |
| King William | 0 | 178,713 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Loudoun | 9,693,857 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Louisa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 336,511 | 0 | 0 | 0 |
| Mecklenburg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 458,569 | 0 | 0 | 0 |
| Northumberland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,850 | 0 | 0 |
| Nottoway | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 592,866 | 0 | 0 | 0 |
| Powhatan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,248,881 | 0 | 0 | 0 |
| Prince George | 0 | 5,484 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Prince William | 4,284,188 | 101,973 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Richmond (City) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,883,716 | 0 | 0 | 0 |
| Rockingham | 0 | 15,903 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Smyth | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spotsylvania | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,243,731 | 8,600 | 0 | 0 |
| Stafford | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,190,092 | 0 | 0 | 0 |
| Warren | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30,366 | 0 | 0 |
| **Total** | **18,337,361** | **773,611** | **550,472** | **100** | **0** | **431,028** | **50,016** | **30,661,367** | **63,295** | **501,457** | **0** |

Table 3b. Production of iron oxide pigment, kyanite, limestone, quartzite, sand, sand and gravel, sandstone, shale, slate, titanium, and vermiculite by county, 2001.

| County/City | Iron Oxide Pigment | Kyanite | Limestone | Quartzite | Salt | Sand | Sand and Gravel | Sandstone | Shale | Slate | Titanium | Vermiculite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accomack | 0 | 0 | 0 | 0 | 0 | 355,490 | 0 | 0 | 0 | 0 | 0 | 0 |
| Albemarle | 0 | 0 | 0 | 0 | 0 | 900 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alleghany | 0 | 0 | 193,246 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Amelia | 0 | 0 | 0 | 0 | 0 | 0 | 182,448 | 0 | 0 | 0 | 0 | 0 |
| Amherst | 0 | 0 | 0 | 0 | 0 | 1,100 | 0 | 0 | 0 | 0 | 0 | 0 |
| Appomattox | 0 | 0 | 276,081 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Augusta | 0 | 0 | 1,095,600 | 0 | 0 | 78,997 | 159,459 | 185,949 | 0 | 0 | 0 | 0 |
| Bath | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 995 | 0 | 0 | 0 |
| Bedford | 0 | 0 | 888,094 | 2,097 | 0 | 10,544 | 3,320 | 0 | 0 | 0 | 0 | 0 |
| Bland | 0 | 0 | 178,865 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Botetourt | 0 | 0 | 2,725,562 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brunswick | 0 | 0 | 0 | 0 | 0 | 3,000 | 0 | 0 | 94,781 | 0 | 0 | 0 |
| Buckingham | 0 | 301,222 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 489,027 | 0 | 0 |
| Campbell | 0 | 0 | 1,354,569 | 0 | 0 | 13,645 | 0 | 200 | 0 | 0 | 0 | 0 |
| Caroline | 0 | 0 | 0 | 0 | 0 | 0 | 337,453 | 0 | 0 | 0 | 0 | 0 |
| Carroll | 0 | 0 | 126,158 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Charles City | 0 | 0 | 0 | 0 | 0 | 0 | 839,039 | 0 | 0 | 0 | 0 | 0 |
| Charlotte | 0 | 0 | 0 | 0 | 0 | 9,264 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chesapeake(City) | 0 | 0 | 0 | 0 | 0 | 486,237 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chesterfield | 0 | 0 | 0 | 0 | 0 | 858 | 0 | 0 | 0 | 0 | 0 | 0 |
| Clarke | 0 | 0 | 181,799 | 0 | 0 | 0 | 0 | 0 | 990 | 0 | 0 | 0 |
| Craig | 0 | 0 | 0 | 0 | 0 | 184,167 | 0 | 0 | 0 | 0 | 0 | 0 |
| Culpeper | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 631,649 | 0 | 0 | 0 | 0 |
| Danville(City) | 0 | 0 | 0 | 0 | 0 | 25,973 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dinwiddie | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 263427 | 0 |
| Essex | 0 | 0 | 0 | 0 | 0 | 3,208 | 600 | 0 | 0 | 0 | 0 | 0 |
| Fauquier | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 162 | 0 | 0 | 0 | 0 |
| Fluvanna | 0 | 0 | 0 | 0 | 0 | 3,821 | 0 | 0 | 0 | 0 | 0 | 0 |
| Frederick | 0 | 0 | 2,921,281 | 446,633 | 0 | 1,830 | 0 | 0 | 9,656 | 0 | 0 | 0 |
| Giles | 0 | 0 | 708,898 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gloucester | 0 | 0 | 0 | 0 | 0 | 23,332 | 201,720 | 0 | 0 | 0 | 0 | 0 |
| Grayson | 0 | 0 | 0 | 0 | 0 | 3,335 | 0 | 0 | 0 | 0 | 0 | 0 |
| Greensville | 0 | 0 | 0 | 0 | 0 | 0 | 190,055 | 0 | 94,781 | 0 | 0 | 0 |

Table 3b (cont.). Production of iron oxide pigment, kyanite, limestone, quartzite, sand, sand and gravel, sandstone, shale, slate, titanium, and vermiculite by county, 2001.

| County/City | Iron Oxide Pigment | Kyanite | Limestone | Quartzite | Salt | Sand | Sand and Gravel | Sandstone | Shale | Slate | Titanium | Vermiculite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Halifax | 0 | 0 | 0 | 0 | 0 | 840,355 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hampton(City) | 0 | 0 | 0 | 0 | 0 | 51,854 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hanover | 0 | 0 | 0 | 0 | 0 | 145,206 | 0 | 0 | 0 | 0 | 0 | 0 |
| Henrico | 0 | 0 | 0 | 0 | 0 | 39,375 | 1,696,145 | 0 | 0 | 0 | 0 | 0 |
| Henry | 0 | 0 | 0 | 0 | 0 | 4,019 | 0 | 0 | 0 | 0 | 0 | 0 |
| Highland | 0 | 0 | 86,525 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Isle of Wight | 0 | 0 | 0 | 0 | 0 | 2,250,182 | 0 | 0 | 0 | 0 | 0 | 0 |
| James City | 0 | 0 | 0 | 0 | 0 | 211,404 | 0 | 0 | 0 | 0 | 0 | 0 |
| King and Queen | 0 | 0 | 0 | 0 | 0 | 62,600 | 85,705 | 0 | 0 | 0 | 0 | 0 |
| King George | 0 | 0 | 0 | 0 | 0 | 0 | 2,669,431 | 0 | 0 | 0 | 0 | 0 |
| King William | 0 | 0 | 0 | 0 | 0 | 4,100 | 1,081,862 | 0 | 0 | 0 | 0 | 0 |
| Lancaster | 0 | 0 | 0 | 0 | 0 | 31,520 | 26,984 | 0 | 0 | 0 | 0 | 0 |
| Lee | 0 | 0 | 721,112 | 0 | 0 | 0 | 0 | 8,600 | 0 | 0 | 0 | 0 |
| Louisa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34,240 |
| Mathews | 0 | 0 | 0 | 0 | 0 | 8,200 | 13,198 | 0 | 0 | 0 | 0 | 0 |
| Mecklenburg | 0 | 0 | 0 | 0 | 0 | 8,491 | 0 | 0 | 0 | 0 | 0 | 0 |
| Middlesex | 0 | 0 | 0 | 0 | 0 | 96,822 | 0 | 0 | 0 | 0 | 0 | 0 |
| Montgomery | 0 | 0 | 1,836,689 | 0 | 0 | 0 | 0 | 0 | 13,500 | 0 | 0 | 0 |
| Nelson | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| New Kent | 0 | 0 | 0 | 0 | 0 | 36,813 | 39,900 | 0 | 0 | 0 | 0 | 0 |
| Northampton | 0 | 0 | 0 | 0 | 0 | 11,035 | 0 | 0 | 0 | 0 | 0 | 0 |
| Northumberland | 0 | 0 | 0 | 0 | 0 | 7,675 | 5,288 | 0 | 0 | 0 | 0 | 0 |
| Orange | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 94,166 | 0 | 0 | 0 |
| Page | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 900 | 0 | 0 | 0 |
| Pittsylvania | 0 | 0 | 0 | 0 | 0 | 28,316 | 0 | 0 | 0 | 352,124 | 0 | 0 |
| Prince George | 0 | 0 | 0 | 0 | 0 | 11,481 | 632,277 | 0 | 0 | 0 | 0 | 0 |
| Pulaski | 233 | 0 | 478,266 | 0 | 0 | 0 | 0 | 0 | 22,260 | 0 | 0 | 0 |
| Richmond | 0 | 0 | 0 | 0 | 0 | 6,212 | 0 | 0 | 0 | 0 | 0 | 0 |
| Roanoke | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 87,000 | 0 | 0 | 0 |
| Rockbridge | 0 | 0 | 223,537 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rockingham | 0 | 0 | 1,643,112 | 0 | 0 | 0 | 303,894 | 0 | 68,566 | 0 | 0 | 0 |
| Russell | 0 | 0 | 1,674,814 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scott | 0 | 0 | 380,817 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Shenandoah | 0 | 0 | 2,811,178 | 0 | 0 | 0 | 0 | 0 | 550 | 0 | 0 | 0 |

Table 3b (cont.). Production of iron oxide pigment, kyanite, limestone, quartzite, sand, sand and gravel, sandstone, shale, slate, titanium, and vermiculite by county, 2001.

| County/City | Iron Oxide Pigment | Kyanite | Limestone | Quartzite | Salt | Sand | Sand and Gravel | Sandstone | Shale | Slate | Titanium | Vermiculite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Smyth | 0 | 0 | 248,845 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Southampton | 0 | 0 | 0 | 0 | 0 | 232,462 | 141,518 | 0 | 0 | 0 | 0 | 0 |
| Spotsylvania | 0 | 0 | 0 | 0 | 0 | 0 | 502,178 | 0 | 0 | 0 | 0 | 0 |
| Stafford | 0 | 0 | 0 | 0 | 0 | 0 | 49,740 | 0 | 0 | 0 | 0 | 0 |
| Suffolk(City) | 0 | 0 | 0 | 0 | 0 | 223,615 | 130,168 | 0 | 0 | 0 | 0 | 0 |
| Surry | 0 | 0 | 0 | 0 | 0 | 86 | 6,799 | 0 | 0 | 0 | 0 | 0 |
| Sussex | 0 | 0 | 0 | 0 | 0 | 20,565 | 284,934 | 0 | 0 | 0 | 0 | 0 |
| Tazewell | 0 | 0 | 1,130,990 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Virginia Beach (City) | 0 | 0 | 0 | 0 | 0 | 583,961 | 0 | 0 | 0 | 0 | 0 | 0 |
| Warren | 0 | 0 | 417,713 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Washington | 0 | 0 | 1,330,411 | 0 | 25,718 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Westmoreland | 0 | 0 | 0 | 0 | 0 | 100,272 | 1,958 | 0 | 0 | 0 | 0 | 0 |
| Wise | 0 | 0 | 341,631 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wythe | 0 | 0 | 517,735 | 632,616 | 0 | 177,218 | 0 | 227,997 | 139,340 | 0 | 0 | 0 |
| York | 0 | 0 | 0 | 0 | 0 | 2,283 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **233** | **301,222** | **24,493,528** | **1,081,346** | **25,718** | **6,401,820** | **9,586,072** | **1,054,557** | **627,485** | **841,151** | **263,427** | **34,240** |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mineral Mining)

Table 4a. Production of basalt, clay, diabase, diorite, dolostone, feldspar, fullers earth, granite, gravel, greenstone, and gypsum by county, 2002.

| County/City | Basalt and Traprock | Clay | Diabase | Diorite | Dolostone | Feldspar | Fullers Earth | Granite | Gravel | Greenstone | Gypsum |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Albemarle | 888,760 | 0 | 0 | 0 | 0 | 0 | 0 | 515,730 | 0 | 0 | 0 |
| Amherst | 0 | 60,705 | 0 | 0 | 0 | 317,472 | 0 | 0 | 0 | 0 | 0 |
| Botetourt | 0 | 215,472 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brunswick | 0 | 19,400 | 0 | 0 | 0 | 0 | 0 | 2,031,193 | 0 | 0 | 0 |
| Campbell | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 632,776 | 0 |
| Caroline | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chesterfield | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,584,037 | 0 | 0 | 0 |
| Culpeper | 0 | 0 | 712,331 | 0 | 0 | 0 | 0 | 23,001 | 0 | 0 | 0 |
| Dinwiddie | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 807,810 | 0 | 0 | 0 |
| Fairfax | 2,223,530 | 0 | 0 | 0 | 0 | 0 | 0 | 2,672,655 | 0 | 0 | 0 |
| Fauquier | 984,185 | 0 | 0 | 0 | 0 | 0 | 0 | 868,500 | 0 | 0 | 0 |
| Floyd | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 66,213 | 0 |
| Franklin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 281,747 | 0 | 0 | 0 |
| Goochland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,093,349 | 0 | 0 | 0 |
| Grayson | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 536,422 | 0 | 0 | 0 |
| Greene | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 762,865 | 0 | 0 | 0 |
| Greensville | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,905,189 | 0 | 0 | 0 |
| Hanover | 0 | 14,400 | 0 | 0 | 0 | 0 | 0 | 2,210,026 | 0 | 0 | 0 |
| Henrico | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,150,482 | 232,000 | 0 | 0 |
| Henry | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 876,120 | 0 | 0 | 0 |
| Isle of Wight | 0 | 4,250 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| King and Queen | 0 | 0 | 0 | 0 | 0 | 0 | 43,458 | 0 | 0 | 0 | 0 |
| King William | 0 | 201,723 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Loudoun | 8,066,034 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Louisa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,298 | 0 | 0 | 0 |
| Mecklenburg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 202,879 | 0 | 0 | 0 |
| Northumberland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 410 | 0 | 0 |
| Nottoway | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 516,369 | 0 | 0 | 0 |
| Pittsylvania | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,894 | 0 | 0 | 0 |
| Powhatan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,242,617 | 0 | 0 | 0 |
| Prince George | 0 | 18,417 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Prince William | 3,581,487 | 101,745 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Richmond (City) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,043,395 | 0 | 0 | 0 |
| Rockingham | 0 | 13,709 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Smyth | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spotsylvania | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,099,207 | 330 | 0 | 0 |
| Stafford | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,672,487 | 0 | 0 | 0 |
| Warren | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21,098 | 0 | 0 |
| Wythe | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,451 | 0 | 0 |
| **Total** | **15,743,996** | **649,821** | **712,331** | **0** | **0** | **317,472** | **43,458** | **28,107,272** | **259,289** | **698,989** | **0** |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mineral Mining)

Table 4b. Production of iron oxide pigment, kyanite, limestone, quartzite, sand, sand and gravel, sandstone, shale, slate, titanium, and vermiculite by county, 2002.

| County/City | Iron Oxide Pigment | Kyanite | Limestone | Quartzite | Salt | Sand | Sand and Gravel | Sandstone | Shale | Slate | Titanium | Vermiculite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accomack | 0 | 0 | 0 | 0 | 0 | 80,671 | 0 | 0 | 0 | 0 | 0 | |
| Albemarle | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Alleghany | 0 | 0 | 334,314 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Amelia | 0 | 0 | 0 | 0 | 0 | 0 | 190,172 | 0 | 0 | 0 | 0 | |
| Amherst | 0 | 0 | 0 | 0 | 0 | 352 | 0 | 0 | 0 | 0 | 0 | |
| Appomattox | 0 | 0 | 240,168 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Augusta | 0 | 0 | 918,244 | 0 | 0 | 94,297 | 140,725 | 191,885 | 0 | 0 | 0 | |
| Bath | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 823 | 0 | 0 | |
| Bedford | 0 | 0 | 860,381 | 0 | 0 | 6,367 | 0 | 0 | 0 | 0 | 0 | |
| Bland | 0 | 0 | 107,207 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Botetourt | 0 | 0 | 2,663,702 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Brunswick | 0 | 0 | 0 | 0 | 0 | 2,480 | 0 | 0 | 88,960 | 0 | 0 | |
| Buckingham | 0 | 93,244 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 513,420 | 0 | |
| Campbell | 0 | 0 | 1,006,107 | 0 | 0 | 4,788 | 0 | 200 | 0 | 0 | 0 | |
| Caroline | 0 | 0 | 0 | 0 | 0 | 0 | 2,310,006 | 0 | 0 | 0 | 0 | |
| Carroll | 0 | 0 | 144,009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Charles City | 0 | 0 | 0 | 0 | 0 | 0 | 124,456 | 0 | 0 | 0 | 0 | |
| Charlotte | 0 | 0 | 0 | 0 | 0 | 7,281 | 0 | 0 | 0 | 0 | 0 | |
| Chesapeake(City) | 0 | 0 | 0 | 0 | 0 | 287,373 | 0 | 0 | 0 | 0 | 0 | |
| Chesterfield | 0 | 0 | 0 | 0 | 0 | 3,060 | 0 | 0 | 0 | 0 | 0 | |
| Clarke | 0 | 0 | 227,106 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Craig | 0 | 0 | 0 | 0 | 0 | 166,212 | 0 | 0 | 0 | 0 | 0 | |
| Culpeper | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 567,983 | 0 | 0 | 0 | |
| Danville(City) | 0 | 0 | 0 | 0 | 0 | 27,529 | 0 | 0 | 0 | 0 | 0 | |
| Dinwiddie | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 251025 | |
| Essex | 0 | 0 | 0 | 0 | 0 | 1,926 | 750 | 0 | 0 | 0 | 0 | |
| Fauquier | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 358 | 0 | 0 | 0 | |
| Fluvanna | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Frederick | 0 | 0 | 2,575,321 | 452,643 | 0 | 1,208 | 0 | 0 | 11,841 | 0 | 0 | |
| Giles | 0 | 0 | 681,100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Gloucester | 0 | 0 | 0 | 0 | 0 | 37,590 | 228,726 | 0 | 0 | 0 | 0 | |
| Grayson | 0 | 0 | 0 | 0 | 0 | 7,631 | 0 | 0 | 0 | 0 | 0 | |
| Greensville | 0 | 0 | 0 | 0 | 0 | 0 | 274,939 | 0 | 475,580 | 0 | 0 | |

Table 4b (cont.). Production of iron oxide pigment, kyanite, limestone, quartzite, sand, sand and gravel, sandstone, shale, slate, titanium, and vermiculite by county, 2002.

| County/City | Iron Oxide Pigment | Kyanite | Limestone | Quartzite | Salt | Sand | Sand and Gravel | Sandstone | Shale | Slate | Titanium | Vermiculite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Halifax | 0 | 0 | 0 | 0 | 0 | 703,432 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hampton(City) | 0 | 0 | 0 | 0 | 0 | 125,250 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hanover | 0 | 0 | 0 | 0 | 0 | 38,277 | 0 | 0 | 0 | 0 | 0 | 0 |
| Henrico | 0 | 0 | 0 | 0 | 0 | 106,275 | 1,209,343 | 0 | 0 | 0 | 0 | 0 |
| Henry | 0 | 0 | 0 | 0 | 0 | 2,100 | 0 | 0 | 0 | 0 | 0 | 0 |
| Highland | 0 | 0 | 42,463 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Isle of Wight | 0 | 0 | 0 | 0 | 0 | 1,435,631 | 0 | 0 | 0 | 0 | 0 | 0 |
| James City | 0 | 0 | 0 | 0 | 0 | 120,863 | 0 | 0 | 0 | 0 | 0 | 0 |
| King and Queen | 0 | 0 | 0 | 0 | 0 | 59,150 | 62,459 | 0 | 0 | 0 | 0 | 0 |
| King George | 0 | 0 | 0 | 0 | 0 | 0 | 2,388,416 | 0 | 0 | 0 | 0 | 0 |
| King William | 0 | 0 | 0 | 0 | 0 | 0 | 1,085,317 | 0 | 0 | 0 | 0 | 0 |
| Lancaster | 0 | 0 | 0 | 0 | 0 | 28,290 | 20,184 | 0 | 0 | 0 | 0 | 0 |
| Lee | 0 | 0 | 878,578 | 0 | 0 | 0 | 0 | 4,700 | 0 | 0 | 0 | 0 |
| Louisa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 33,200 |
| Mathews | 0 | 0 | 0 | 0 | 0 | 8,700 | 28,072 | 0 | 0 | 0 | 0 | 0 |
| Mecklenburg | 0 | 0 | 0 | 0 | 0 | 8,891 | 0 | 0 | 0 | 0 | 0 | 0 |
| Middlesex | 0 | 0 | 0 | 0 | 0 | 73,055 | 0 | 0 | 0 | 0 | 0 | 0 |
| Montgomery | 0 | 0 | 1,681,671 | 0 | 0 | 0 | 0 | 0 | 11,374 | 0 | 0 | 0 |
| Nelson | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| New Kent | 0 | 0 | 0 | 0 | 0 | 32,139 | 23,794 | 0 | 0 | 0 | 0 | 0 |
| Northampton | 0 | 0 | 0 | 0 | 0 | 5,959 | 0 | 0 | 0 | 0 | 0 | 0 |
| Northumberland | 0 | 0 | 0 | 0 | 0 | 7,675 | 2,685 | 0 | 0 | 0 | 0 | 0 |
| Orange | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 94,794 | 0 | 0 | 0 |
| Page | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 800 | 0 | 0 | 0 |
| Pittsylvania | 0 | 0 | 0 | 0 | 0 | 14,430 | 0 | 0 | 0 | 375,553 | 0 | 0 |
| Prince Edward | 0 | 361 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Prince George | 0 | 0 | 0 | 0 | 0 | 8,154 | 924,819 | 0 | 0 | 0 | 0 | 0 |
| Pulaski | 195 | 0 | 418,875 | 0 | 0 | 0 | 0 | 0 | 150 | 0 | 0 | 0 |
| Richmond | 0 | 0 | 0 | 0 | 0 | 3,302 | 0 | 0 | 0 | 0 | 0 | 0 |
| Roanoke | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 87,494 | 0 | 0 | 0 |
| Rockbridge | 0 | 0 | 232,336 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rockingham | 0 | 0 | 1,566,714 | 0 | 0 | 0 | 279,729 | 0 | 30,715 | 0 | 0 | 0 |
| Russell | 0 | 0 | 1,231,779 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Scott | 0 | 0 | 385,084 | 0 | 0 | 0 | 0 | 0 | 115,220 | 0 | 0 | 0 |
| Shenandoah | 0 | 0 | 2,563,278 | 0 | 0 | 0 | 0 | 0 | 500 | 0 | 0 | 0 |

Table 4b (cont.). Production of iron oxide pigment, kyanite, limestone, quartzite, sand, sand and gravel, sandstone, shale, slate, titanium, and vermiculite by county, 2002.

| County/City | Iron Oxide Pigment | Kyanite | Limestone | Quartzite | Salt | Sand | Sand and Gravel | Sandstone | Shale | Slate | Titanium | Vermiculite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Smyth | 0 | 0 | 214,053 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Southampton | 0 | 0 | 0 | 0 | 0 | 497,130 | 120,673 | 0 | 0 | 0 | 0 | 0 |
| Spotsylvania | 0 | 0 | 0 | 0 | 0 | 0 | 501,663 | 0 | 0 | 0 | 0 | 0 |
| Stafford | 0 | 0 | 0 | 0 | 0 | 0 | 34,434 | 0 | 0 | 0 | 0 | 0 |
| Suffolk(City) | 0 | 0 | 0 | 0 | 0 | 46,767 | 72,110 | 0 | 0 | 0 | 0 | 0 |
| Surry | 0 | 0 | 0 | 0 | 0 | 2,575 | 511 | 0 | 0 | 0 | 0 | 0 |
| Sussex | 0 | 0 | 0 | 0 | 0 | 19,080 | 294,034 | 0 | 0 | 0 | 0 | 0 |
| Tazewell | 0 | 0 | 1,276,345 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Virginia Beach (City) | 0 | 0 | 0 | 0 | 0 | 511,785 | 0 | 0 | 0 | 0 | 0 | 0 |
| Warren | 0 | 0 | 417,713 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Washington | 0 | 0 | 782,135 | 0 | 54,339 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Westmoreland | 0 | 0 | 0 | 0 | 0 | 87,597 | 348 | 0 | 0 | 0 | 0 | 0 |
| Wise | 0 | 0 | 455,500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Wythe | 0 | 0 | 312,627 | 495,716 | 0 | 287,356 | 0 | 178,783 | 160,778 | 0 | 0 | 0 |
| York | 0 | 0 | 0 | 0 | 0 | 684 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **195** | **93,605** | **22,216,809** | **948,359** | **54,339** | **4,963,312** | **10,318,365** | **943,909** | **1,079,029** | **888,973** | **251,025** | **33,200** |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mineral Mining)

Table 5a. Production of basalt, clay, diabase, diorite, dolostone, feldspar, fullers earth, granite, gravel, greenstone, and gypsum by county, 2003.

| County/City | Basalt and Traprock | Clay | Diabase | Diorite | Dolostone | Feldspar | Fullers Earth | Granite | Gravel | Greenstone | Gypsum |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Albemarle | 1,035,662 | 0 | 0 | 0 | 0 | 0 | 0 | 564,592 | 0 | 0 | 0 |
| Amherst | 0 | 57,140 | 0 | 0 | 0 | 409,976 | 0 | 0 | 0 | 0 | 0 |
| Botetourt | 0 | 2,166,624 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brunswick | 0 | 87,923 | 0 | 0 | 0 | 0 | 0 | 2,049,200 | 0 | 0 | 0 |
| Campbell | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 471,314 | 0 |
| Caroline | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chesterfield | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,465,326 | 0 | 0 | 0 |
| Culpeper | 0 | 0 | 1,716,769 | 0 | 0 | 0 | 0 | 70,249 | 0 | 0 | 0 |
| Dinwiddie | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 886,707 | 0 | 0 | 0 |
| Fairfax | 2,318,286 | 0 | 0 | 0 | 0 | 0 | 0 | 2,701,272 | 0 | 0 | 0 |
| Fauquier | 1,057,008 | 0 | 0 | 0 | 0 | 0 | 0 | 912,760 | 0 | 0 | 0 |
| Floyd | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 116,605 | 0 |
| Franklin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 423,254 | 0 | 0 | 0 |
| Goochland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4,977,624 | 0 | 0 | 0 |
| Grayson | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 588,507 | 0 | 0 | 0 |
| Greene | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 805,556 | 0 | 0 | 0 |
| Greensville | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,684,368 | 0 | 0 | 0 |
| Hanover | 0 | 10,500 | 0 | 0 | 0 | 0 | 0 | 2,198,332 | 1,410 | 0 | 0 |
| Henrico | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,054,504 | 0 | 0 | 0 |
| Henry | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 976,686 | 0 | 0 | 0 |
| Isle of Wight | 0 | 116,382 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| King and Queen | 0 | 0 | 0 | 0 | 0 | 0 | 51,854 | 0 | 0 | 0 | 0 |
| King William | 0 | 233,413 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Loudoun | 8,692,145 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Louisa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7,339 | 0 | 0 | 0 |
| Mecklenburg | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 423,901 | 0 | 0 | 0 |
| Northumberland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,840 | 0 | 0 |
| Nottoway | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 636,509 | 0 | 0 | 0 |
| Pittsylvania | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 55,105 | 0 | 0 | 0 |
| Powhatan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,374,422 | 0 | 0 | 0 |
| Prince George | 0 | 6,774 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Prince William | 3,842,974 | 90,125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Richmond (City) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,215,098 | 0 | 0 | 0 |
| Rockingham | 0 | 18,620 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Smyth | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spotsylvania | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,527,369 | 9,109 | 0 | 0 |
| Stafford | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,058,476 | 0 | 0 | 0 |
| Warren | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 28,782 | 0 | 0 |
| Wythe | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,323 | 0 | 0 |
| **Total** | **16,946,075** | **2,787,501** | **1,716,769** | **0** | **0** | **409,976** | **51,854** | **29,657,157** | **45,464** | **587,919** | **0** |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mineral Mining)

Table 5b. Production of iron oxide pigment, kyanite, limestone, quartzite, sand, sand and gravel, sandstone, shale, slate, titanium, and vermiculite by county, 2003.

| County/City | Iron Oxide Pigment | Kyanite | Limestone | Quartzite | Salt | Sand | Sand and Clay | Sand and Gravel | Sandstone | Shale | Slate | Titanium | Vermiculite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accomack | 0 | 0 | 0 | 0 | 0 | 123,046 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Albemarle | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Alleghany | 0 | 0 | 191,276 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Amelia | 0 | 0 | 0 | 0 | 0 | 0 | | 193,420 | 0 | 0 | 0 | 0 | 0 |
| Amherst | 0 | 0 | 0 | 0 | 0 | 10,810 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Appomattox | 0 | 0 | 240,000 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Augusta | 0 | 0 | 1,016,027 | 0 | 0 | 82,958 | | 174,313 | 179,711 | 0 | 0 | 0 | 0 |
| Bath | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 525 | 0 | 0 | 0 |
| Bedford | 0 | 0 | 1,022,039 | 1,266 | 0 | 16,726 | | 8,592 | 0 | 0 | 0 | 0 | 0 |
| Bland | 0 | 0 | 140,565 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Botetourt | 0 | 0 | 2,189,389 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Brunswick | 0 | 0 | 0 | 0 | 0 | 2,880 | | 0 | 0 | 87,923 | 0 | 0 | 0 |
| Buckingham | 0 | 93,037 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 561,550 | 0 | 0 |
| Campbell | 0 | 0 | 1,406,324 | 0 | 0 | 16,409 | | 0 | 60 | 0 | 0 | 0 | 0 |
| Caroline | 0 | 0 | 0 | 0 | 0 | 0 | | 319,990 | 0 | 0 | 0 | 0 | 0 |
| Carroll | 0 | 0 | 166,575 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Charles City | 0 | 0 | 0 | 0 | 0 | 0 | | 1,841,408 | 0 | 0 | 0 | 0 | 0 |
| Charlotte | 0 | 0 | 0 | 0 | 0 | 3,810 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Chesapeake(City) | 0 | 0 | 0 | 0 | 0 | 394,448 | 369,806 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chesterfield | 0 | 0 | 0 | 0 | 0 | 0 | 8,000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Clarke | 0 | 0 | 183,620 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Craig | 0 | 0 | 0 | 0 | 0 | 170,225 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Culpeper | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 648,838 | 0 | 0 | 0 | 0 |
| Danville(City) | 0 | 0 | 0 | 0 | 0 | 29,640 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Dinwiddie | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 360248 | 0 |
| Essex | 0 | 0 | 0 | 0 | 0 | 12,500 | | 3,000 | 0 | 0 | 0 | 0 | 0 |
| Fauquier | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 40 | 0 | 0 | 0 | 0 |
| Fluvanna | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Frederick | 0 | 0 | 2,676,744 | 431,869 | 0 | 100 | | 0 | 0 | 14,399 | 0 | 0 | 0 |
| Giles | 0 | 0 | 748,350 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Gloucester | 0 | 0 | 0 | 0 | 0 | 54,790 | | 199,755 | 0 | 0 | 0 | 0 | 0 |
| Grayson | 0 | 0 | 0 | 0 | 0 | 10,219 | | 1,000 | 0 | 0 | 0 | 0 | 0 |
| Greensville | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |

Table 5b (cont.). Production of iron oxide pigment, kyanite, limestone, quartzite, sand, sand and gravel, sandstone, shale, slate, titanium, and vermiculite by county, 2003.

| County/City | Iron Oxide Pigment | Kyanite | Limestone | Quartzite | Salt | Sand | Sand and Clay | Sand and Gravel | Sandstone | Shale | Slate | Titanium | Vermiculite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Halifax | 0 | 0 | 0 | 0 | 0 | 670,528 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Hampton(City) | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Hanover | 0 | 0 | 0 | 0 | 0 | 73,928 | | 99,653 | 0 | 0 | 0 | 0 | 0 |
| Henrico | 0 | 0 | 0 | 0 | 0 | 1,312 | | 1,249,055 | 0 | 0 | 0 | 0 | 0 |
| Henry | 0 | 0 | 0 | 0 | 0 | 5,568 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Highland | 0 | 0 | 57,472 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Isle of Wight | 0 | 0 | 0 | 0 | 0 | 1,078,538 | | 0 | 0 | 0 | 0 | 0 | 0 |
| James City | 0 | 0 | 0 | 0 | 0 | 64,492 | | 0 | 0 | 0 | 0 | 0 | 0 |
| King and Queen | 0 | 0 | 0 | 0 | 0 | 47,450 | | 317,558 | 0 | 0 | 0 | 0 | 0 |
| King George | 0 | 0 | 0 | 0 | 0 | 0 | | 2,535,462 | 0 | 0 | 0 | 0 | 0 |
| King William | 0 | 0 | 0 | 0 | 0 | 0 | | 723,614 | 0 | 0 | 0 | 0 | 0 |
| Lancaster | 0 | 0 | 0 | 0 | 0 | 32,320 | | 30,026 | 0 | 0 | 0 | 0 | 0 |
| Lee | 0 | 0 | 971,685 | 0 | 0 | 0 | | 0 | 3,900 | 0 | 0 | 0 | 0 |
| Louisa | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 34,391 |
| Mathews | 0 | 0 | 0 | 0 | 0 | 8,760 | | 142,339 | 0 | 0 | 0 | 0 | 0 |
| Mecklenburg | 0 | 0 | 0 | 0 | 0 | 11,855 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Middlesex | 0 | 0 | 0 | 0 | 0 | 74,521 | 3,000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Montgomery | 0 | 0 | 1,587,941 | 0 | 0 | 0 | | 0 | 0 | 20,974 | 0 | 0 | 0 |
| Nelson | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| New Kent | 0 | 0 | 0 | 0 | 0 | 23,304 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Northampton | 0 | 0 | 0 | 0 | 0 | 48,583 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Northumberland | 0 | 0 | 0 | 0 | 0 | 32,504 | | 5,610 | 0 | 0 | 0 | 0 | 0 |
| Orange | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 90,156 | 0 | 0 | 0 |
| Page | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 7,004 | 0 | 0 | 0 |
| Pittsylvania | 0 | 0 | 0 | 0 | 0 | 39,558 | | 0 | 0 | 0 | 50,323 | 0 | 0 |
| Prince Edward | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Prince George | 0 | 0 | 0 | 0 | 0 | 79,008 | | 877,110 | 0 | 0 | 0 | 0 | 0 |
| Pulaski | 15 | 0 | 454,029 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Richmond | 0 | 0 | 0 | 0 | 0 | 4,820 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Roanoke | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 48,941 | 0 | 0 | 0 |
| Rockbridge | 0 | 0 | 236,408 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Rockingham | 0 | 0 | 1,863,927 | 0 | 0 | 0 | | 224,522 | 0 | 26,810 | 0 | 0 | 0 |
| Russell | 0 | 0 | 1,438,792 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Scott | 0 | 0 | 449,349 | 0 | 0 | 0 | | 0 | 0 | 146,826 | 0 | 0 | 0 |
| Shenandoah | 0 | 0 | 2,806,617 | 0 | 0 | 75 | | 0 | 0 | 1,500 | 0 | 0 | 0 |

Table 5b (cont.). Production of iron oxide pigment, kyanite, limestone, quartzite, sand, sand and gravel, sandstone, shale, slate, titanium, and vermiculite by county, 2003.

| County/City | Iron Oxide Pigment | Kyanite | Limestone | Quartzite | Salt | Sand | Sand and Clay | Sand and Gravel | Sandstone | Shale | Slate | Titanium | Vermiculite |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Smyth | 0 | 0 | 496,089 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Southampton | 0 | 0 | 0 | 0 | 0 | 143,401 | | 99,124 | 0 | 0 | 0 | 0 | 0 |
| Spotsylvania | 0 | 0 | 0 | 0 | 0 | 0 | | 92,117 | 0 | 0 | 0 | 0 | 0 |
| Stafford | 0 | 0 | 0 | 0 | 0 | 0 | | 34,105 | 0 | 0 | 0 | 0 | 0 |
| Suffolk(City) | 0 | 0 | 0 | 0 | 0 | 0 | | 122,826 | 0 | 0 | 0 | 0 | 0 |
| Surry | 0 | 0 | 0 | 0 | 0 | 13,905 | | 726 | 0 | 0 | 0 | 0 | 0 |
| Sussex | 0 | 0 | 0 | 0 | 0 | 21,900 | | 204,826 | 0 | 0 | 0 | 0 | 0 |
| Tazewell | 0 | 0 | 1,317,638 | 0 | 0 | 100 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Virginia Beach (City) | 0 | 0 | 0 | 0 | 0 | 1,354,115 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Warren | 0 | 0 | 139,115 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Washington | 0 | 0 | 771,841 | 0 | 59,155 | 8,401 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Westmoreland | 0 | 0 | 0 | 0 | 0 | 119,075 | | 250 | 0 | 0 | 0 | 0 | 0 |
| Wise | 0 | 0 | 590,800 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Wythe | 0 | 0 | 602,842 | 583,728 | 0 | 122,755 | | 0 | 200,130 | 169,568 | 0 | 0 | 0 |
| York | 0 | 0 | 0 | 0 | 0 | 60 | | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **15** | **93,037** | **23,765,454** | **1,016,863** | **59,155** | **5,009,397** | **380,806** | **9,500,401** | **1,032,679** | **614,626** | **611,873** | **360,248** | **34,391** |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mineral Mining)

Table 6. Coal mine production and value 1999-2003.

| Year | Quantity (total production in short tons)[1] | unit price (dollars / short ton)[2] | value |
|---|---|---|---|
| 1999 | 32,253,994 | $26.30 | $848,280,042.20 |
| 2000 | 33,259,580 | $25.95 | $863,086,101.00 |
| 2001 | 32,600,564 | $28.72 | $936,288,198.08 |
| 2002 | 31,746,140 | $31.09 | $986,987,492.60 |
| 2003 | 31,682,622 | $30.30 | $959,983,446.60 |

1. Virginia Department of Mines, Minerals and Energy, Division of Mines, Big Stone Gap, Virginia
2. U.S. Department of Energy, Energy Information Agency, Washington D.C.

Table 7. Coal mine production in Virginia by mine method and county, 1999.

| Mine Method | County | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Buchanan** | **Dickenson** | **Lee** | **Russell** | **Scott** | **Tazewell** | **Wise** | **Total** |
| **Number of Mines** | | | | | | | | |
| Auger | 8 | 8 | 3 | 2 | 0 | 0 | 23 | 44 |
| Strip | 12 | 13 | 3 | 4 | 0 | 0 | 30 | 62 |
| Surface Total | 20 | 21 | 6 | 6 | 0 | 0 | 53 | 106 |
| Underground Total | 120 | 34 | 14 | 8 | 0 | 26 | 53 | 255 |
| **Total Mines** | **140** | **55** | **20** | **14** | **0** | **26** | **106** | **361** |
| **Tonnage by mine method (short tons)** | | | | | | | | |
| Auger | 124,504 | 52,982 | 34,015 | 4,858 | 0 | 0 | 313,755 | 530,114 |
| Strip | 1,168,151 | 1,487,405 | 185,192 | 456,965 | 0 | 0 | 5,331,592 | 8,629,305 |
| **Surface Total** | **1,292,655** | **1,540,387** | **219,207** | **461,823** | **0** | **0** | **5,645,347** | **9,159,419** |
| Longwall | 5,192,117 | 0 | 0 | 0 | 0 | 0 | 0 | 5,192,117 |
| Continuous Miner | 3,599,591 | 2,684,977 | 932,281 | 839,709 | 0 | 1,930,922 | 7,855,459 | 17,842,939 |
| Other | 0 | 59,519 | 0 | 0 | 0 | 0 | 0 | 59,519 |
| **Underground Total** | **8,791,708** | **2,744,496** | **932,281** | **839,709** | **0** | **1,930,922** | **7,855,459** | **23,094,575** |
| **Total Production** | **10,084,363** | **4,284,883** | **1,151,488** | **1,301,532** | **0** | **1,930,922** | **13,500,806** | **32,253,994** |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mines)

Table 8. Coal mine production in Virginia by mine method and county, 2000.

| Mine Method | County | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Buchanan | Dickenson | Lee | Russell | Scott | Tazewell | Wise | Total |
| **Number of Mines** | | | | | | | | |
| Auger | 9 | 10 | 3 | 0 | 0 | 0 | 31 | 53 |
| Strip | 12 | 16 | 3 | 4 | 0 | 0 | 30 | 65 |
| Surface Total | 21 | 26 | 6 | 4 | 0 | 0 | 61 | 118 |
| Underground Total | 96 | 37 | 15 | 8 | 0 | 22 | 49 | 227 |
| **Total Mines** | **117** | **63** | **21** | **12** | **0** | **22** | **110** | **345** |
| **Tonnage by mine method (short tons)** | | | | | | | | |
| Auger | 157,977 | 15,711 | 1,131 | 0 | 0 | 0 | 1,609,537 | 1,784,356 |
| Strip | 1,484,820 | 797,786 | 30,258 | 460,924 | 0 | 0 | 5,077,423 | 7,851,211 |
| **Surface Total** | **1,642,797** | **813,497** | **31,389** | **460,924** | **0** | **0** | **6,686,960** | **9,635,567** |
| Longwall | 5,752,332 | 0 | 0 | 0 | 0 | 0 | 0 | 5,752,332 |
| Continuous Miner | 3,648,559 | 3,285,950 | 1,007,008 | 630,121 | 0 | 1,491,770 | 7,808,273 | 17,871,681 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Underground Total** | **9,400,891** | **3,285,950** | **1,007,008** | **630,121** | **0** | **1,491,770** | **7,808,273** | **23,624,013** |
| **Total Production** | **11,043,688** | **4,099,447** | **1,038,397** | **1,091,045** | **0** | **1,491,770** | **14,495,233** | **33,259,580** |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mines)

Table 9. Coal mine production in Virginia by mine method and county, 2001.

| Mine Method | County | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Buchanan | Dickenson | Lee | Russell | Scott | Tazewell | Wise | Total |
| **Number of Mines** | | | | | | | | |
| Auger | 11 | 6 | 2 | 0 | 0 | 0 | 30 | 49 |
| Strip | 18 | 11 | 4 | 3 | 0 | 3 | 30 | 69 |
| Surface Total | 29 | 17 | 6 | 3 | 0 | 3 | 60 | 118 |
| Underground Total | 81 | 38 | 12 | 8 | 0 | 22 | 48 | 209 |
| **Total Mines** | **110** | **55** | **18** | **11** | **0** | **25** | **108** | **327** |
| **Tonnage by mine method (short tons)** | | | | | | | | |
| Auger | 214,091 | 64,731 | 5,080 | 0 | 0 | 0 | 242,372 | 526,274 |
| Strip | 1,828,206 | 659,083 | 91,657 | 490,160 | 0 | 155,593 | 6,182,164 | 9,406,863 |
| **Surface Total** | **2,042,297** | **723,814** | **96,737** | **490,160** | **0** | **155,593** | **6,424,536** | **9,933,137** |
| Longwall | 5,703,821 | 0 | 0 | 0 | 0 | 0 | 0 | 5,703,821 |
| Continuous Miner | 3,600,005 | 3,044,422 | 685,530 | 748,123 | 0 | 1,566,977 | 7,318,549 | 16,963,606 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Underground Total** | **9,303,826** | **3,044,422** | **685,530** | **748,123** | **0** | **1,566,977** | **7,318,549** | **22,667,427** |
| **Total Production** | **11,346,123** | **3,768,236** | **782,267** | **1,238,283** | **0** | **1,722,570** | **13,743,085** | **32,600,564** |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mines)

Table 10. Coal mine production in Virginia by mine method and county, 2002.

| Mine Method | County | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Buchanan | Dickenson | Lee | Russell | Scott | Tazewell | Wise | Total |
| **Number of Mines** | | | | | | | | |
| Auger | 10 | 8 | 2 | 1 | 0 | 0 | 18 | 39 |
| Strip | 17 | 11 | 3 | 8 | 0 | 3 | 31 | 73 |
| Surface Total | 27 | 19 | 5 | 9 | 0 | 3 | 49 | 112 |
| Underground Total | 81 | 34 | 16 | 8 | 0 | 23 | 50 | 212 |
| **Total Mines** | **108** | **53** | **21** | **17** | **0** | **26** | **99** | **324** |
| **Tonnage by mine method (short tons)** | | | | | | | | |
| Auger | 162,859 | 70,840 | 10,354 | 11,153 | 0 | 0 | 161,586 | 416,792 |
| Strip | 1,368,718 | 645,953 | 169,782 | 359,444 | 0 | 291,119 | 5,597,001 | 8,432,017 |
| **Surface Total** | **1,531,577** | **716,793** | **180,136** | **370,597** | **0** | **291,119** | **5,758,587** | **8,848,809** |
| Longwall | 5,340,604 | 0 | 0 | 0 | 0 | 0 | 0 | 5,340,604 |
| Continuous Miner | 2,971,095 | 2,868,231 | 422,185 | 605,496 | 0 | 1,306,664 | 9,383,056 | 17,556,727 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Underground Total** | **8,311,699** | **2,868,231** | **422,185** | **605,496** | **0** | **1,306,664** | **9,383,056** | **22,897,331** |
| **Total Production** | **9,843,276** | **3,585,024** | **602,321** | **976,093** | **0** | **1,597,783** | **15,141,643** | **31,746,140** |

Table 11. Coal mine production in Virginia by mine method and county, 2003.

| Mine Method | County | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Buchanan | Dickenson | Lee | Russell | Scott | Tazewell | Wise | Total |
| **Number of Mines** | | | | | | | | |
| Auger | 10 | 10 | 1 | 1 | 0 | 0 | 17 | 39 |
| Strip | 15 | 11 | 3 | 6 | 0 | 3 | 27 | 65 |
| Surface Total | 25 | 21 | 4 | 7 | 0 | 3 | 44 | 104 |
| Underground Total | 68 | 29 | 10 | 8 | 0 | 17 | 60 | 192 |
| **Total Mines** | **93** | **50** | **14** | **15** | **0** | **20** | **104** | **296** |
| **Tonnage by mine method (short tons)** | | | | | | | | |
| Auger | 136,910 | 73,473 | 7,408 | 8,154 | 0 | 0 | 86,292 | 312,237 |
| Strip | 2,216,250 | 687,224 | 198,351 | 457,962 | 0 | 280,306 | 6,121,292 | 9,961,385 |
| **Surface Total** | **2,353,160** | **760,697** | **205,759** | **466,116** | **0** | **280,306** | **6,207,584** | **10,273,622** |
| Longwall | 5,755,247 | 0 | 0 | 0 | 0 | 0 | 0 | 5,755,247 |
| Continuous Miner | 2,403,517 | 3,808,244 | 642,261 | 413,183 | 0 | 1,025,690 | 7,360,858 | 15,653,753 |
| Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Underground Total** | **8,158,764** | **3,808,244** | **642,261** | **413,183** | **0** | **1,025,690** | **7,360,858** | **21,409,000** |
| **Total Production** | **10,511,924** | **4,568,941** | **848,020** | **879,299** | **0** | **1,305,996** | **13,568,442** | **31,682,622** |

Table 12. Virginia coal production from 1980 to 2003 by mine type (short tons) and total number of mines.

| Year | Auger | Strip | Surface Total | Longwall | Continuous Miner | Other | Underground Total | Year Total | Total number of mines |
|---|---|---|---|---|---|---|---|---|---|
| 1980 | na | na | 8,661,789 | na | na | na | 32,898,455 | 41,560,244 | na |
| 1981 | na | na | 8,485,899 | na | na | na | 33,491,908 | 41,977,807 | na |
| 1982 | na | na | 8,342,714 | na | na | na | 32,138,574 | 40,481,288 | na |
| 1983 | na | na | 7,577,392 | na | na | na | 27,939,664 | 35,517,056 | na |
| 1984 | 349,776 | 6,959,495 | 7,309,271 | 2,990,701 | 20,939,304 | 10,185,477 | 34,115,482 | 41,424,753 | na |
| 1985 | 399,949 | 6,708,530 | 7,108,479 | 4,991,328 | 23,479,854 | 6,796,823 | 35,268,005 | 42,376,484 | na |
| 1986 | 425,518 | 6,676,166 | 7,101,684 | 6,636,901 | 22,770,370 | 5,259,187 | 34,666,458 | 41,768,142 | 656 |
| 1987 | 559,434 | 6,855,058 | 7,414,492 | 9,203,133 | 24,684,833 | 4,235,502 | 38,123,468 | 45,537,960 | 606 |
| 1988 | 396,946 | 7,545,693 | 7,942,639 | 10,121,303 | 26,334,118 | 1,966,587 | 38,422,008 | 46,364,647 | 545 |
| 1989 | 166,014 | 6,797,131 | 6,963,145 | 9,393,809 | 26,015,254 | 1,483,023 | 36,892,086 | 43,855,231 | 509 |
| 1990 | 157,356 | 7,624,856 | 7,782,212 | 9,998,266 | 27,338,660 | 1,517,570 | 38,854,496 | 46,636,708 | 491 |
| 1991 | 320,692 | 7,766,675 | 8,087,367 | 8,318,486 | 25,008,293 | 921,990 | 34,248,769 | 42,336,136 | 484 |
| 1992 | 320,099 | 7,854,222 | 8,174,321 | 9,322,187 | 24,548,952 | 518,060 | 34,389,199 | 42,563,520 | 424 |
| 1993 | 463,793 | 9,131,795 | 9,595,588 | 7,247,250 | 23,123,872 | 176,896 | 30,548,018 | 40,143,606 | 416 |
| 1994 | 331,629 | 9,039,040 | 9,370,669 | 7,317,056 | 21,271,402 | 846,118 | 29,434,576 | 38,805,245 | 422 |
| 1995 | 204,686 | 8,704,338 | 8,909,024 | 5,935,586 | 21,001,711 | 70,887 | 27,008,184 | 35,917,208 | 375 |
| 1996 | 307,627 | 9,294,493 | 9,602,120 | 4,912,674 | 22,157,266 | 134,171 | 27,204,111 | 36,806,231 | 331 |
| 1997 | 405,698 | 8,494,642 | 8,900,340 | 7,884,760 | 20,012,552 | 91,514 | 27,988,826 | 36,889,166 | 357 |
| 1998 | 387,573 | 7,656,705 | 8,044,278 | 6,359,061 | 19,244,440 | 363,465 | 25,966,966 | 34,011,244 | 355 |
| 1999 | 530,114 | 8,629,305 | 9,159,419 | 5,192,117 | 17,842,939 | 59,519 | 23,094,575 | 32,253,994 | 361 |
| 2000 | 1,784,356 | 7,851,211 | 9,635,567 | 5,452,332 | 17,871,681 | 0 | 23,324,013 | 32,959,580 | 345 |
| 2001 | 526,274 | 9,406,863 | 9,933,137 | 5,703,821 | 16,963,606 | 0 | 22,667,427 | 32,600,564 | 327 |
| 2002 | 416,792 | 8,432,017 | 8,848,809 | 5,340,604 | 17,556,727 | 0 | 22,897,331 | 31,746,140 | 324 |
| 2003 | 312,237 | 9,961,385 | 10,273,622 | 5,755,247 | 15,653,753 | 0 | 21,409,000 | 31,682,622 | 296 |

na -- data not available or not compiled using the header categories

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mines)

Table 13. Coal mine production (short tons) in Virginia by coal bed in stratigraphic order and county, 1999.

| Geologic Formation / Coal Bed / Coal Zone | County | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Buchanan | Dickenson | Lee | Russell | Scott | Tazewell | Wise | Total |
| **Harlan Formation** | | | | | | | | |
| no production reported | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Harlan Formation total** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **Wise Formation** | | | | | | | | |
| High Splint | 0 | 0 | 0 | 0 | 0 | 0 | 101,007 | 101,007 |
| Morris | 0 | 0 | 0 | 0 | 0 | 0 | 165,587 | 165,587 |
| Pardee zone (Parsons, Upper Parson) | 0 | 0 | 0 | 0 | 0 | 0 | 506,380 | 506,380 |
| Wax | 0 | 0 | 0 | 0 | 0 | 0 | 29,347 | 29,347 |
| Gin Creek (No. 8) | 0 | 0 | 0 | 0 | 0 | 0 | 100,520 | 100,520 |
| Phillips (Wallins?) | 0 | 0 | 440,541 | 0 | 0 | 0 | 442,689 | 883,230 |
| Jack Rock | 0 | 0 | 0 | 0 | 0 | 0 | 35,409 | 35,409 |
| Little Red | 0 | 0 | 0 | 0 | 0 | 0 | 19,849 | 19,849 |
| House | 0 | 0 | 0 | 0 | 0 | 0 | 77,712 | 77,712 |
| Low Splint (Creech, Creech Sea?) | 0 | 0 | 7,329 | 0 | 0 | 0 | 1,726,392 | 1,733,721 |
| 34-inch (Cedar Grove, E Seam?) | 0 | 0 | 117,130 | 0 | 0 | 0 | 146,867 | 263,997 |
| Owl | 0 | 0 | 0 | 0 | 0 | 0 | 81,126 | 81,126 |
| Taggart | 0 | 0 | 69,485 | 0 | 0 | 0 | 736,164 | 805,649 |
| Taggart Marker (Kellioka) | 0 | 0 | 1,571 | 0 | 0 | 0 | 421,010 | 422,581 |
| Wilson (Harlan, Harlan Rider, Upper Standiford) | 0 | 0 | 515,432 | 0 | 0 | 0 | 173,984 | 689,416 |
| Upper St. Charles (Redwine, Standiford) | 0 | 0 | 0 | 0 | 0 | 0 | 716,476 | 716,476 |
| Pinhook | 0 | 0 | 0 | 0 | 0 | 0 | 141,176 | 141,176 |
| Kelly (Upper Bolling) | 0 | 0 | 0 | 0 | 0 | 0 | 1,055,827 | 1,055,827 |
| Imboden (Campbell Creek, Lower Bolling) | 148,078 | 2,582 | 0 | 0 | 0 | 0 | 1,751,366 | 1,902,026 |
| Clintwood zone (Upper Clintwood, Lower Clintwood, Clintwood Marker) | 193,889 | 893,005 | 0 | 0 | 0 | 0 | 612,505 | 1,699,399 |
| Blair zone (Blair Rider, Blair Marker)[1] | 0 | 0 | 0 | 0 | 0 | 0 | 1,518,412 | 1,518,412 |
| Lyons (Eagle) | 527,618 | 143,012 | 0 | 0 | 0 | 0 | 268,157 | 938,787 |
| Dorchester ("Blair" of Buchanan and Dickenson Counties)[1] | 637,330 | 399,340 | 0 | 0 | 0 | 0 | 723,311 | 1,759,981 |
| **Wise Formation total** | **1,506,915** | **1,437,939** | **1,151,488** | **0** | **0** | **0** | **11,551,273** | **15,647,615** |
| **Norton Formation** | | | | | | | | |
| Norton | 0 | 0 | 0 | 0 | 0 | 0 | 402,817 | 402,817 |
| Hagy (Edwards) | 546,665 | 64,259 | 0 | 0 | 0 | 0 | 335,796 | 946,720 |
| Splash Dam | 668,453 | 608,979 | 0 | 836 | 0 | 0 | 0 | 1,278,268 |
| Upper Banner (Upper Banner 1) | 0 | 603,038 | 0 | 339,166 | 0 | 0 | 147,853 | 1,090,057 |
| Lower Banner | 0 | 1,283,301 | 0 | 121,742 | 0 | 0 | 7,698 | 1,412,741 |
| Kennedy | 498,093 | 0 | 0 | 293,948 | 0 | 0 | 0 | 792,041 |
| **Norton Formation total** | **1,713,211** | **2,559,577** | **0** | **755,692** | **0** | **0** | **894,164** | **5,922,644** |
| **Norton / Lee / New River Formation** | | | | | | | | |
| Raven (Red Ash) | 139,913 | 58,943 | 0 | 0 | 0 | 0 | 28,966 | 227,822 |
| Jawbone | 691,270 | 221,131 | 0 | 545,761 | 0 | 0 | 1,026,403 | 2,484,565 |
| Tiller | 0 | 0 | 0 | 0 | 0 | 268,375 | 0 | 268,375 |
| Greasy Creek | 0 | 0 | 0 | 0 | 0 | 621,702 | 0 | 621,702 |
| Lower Seaboard | 0 | 0 | 0 | 0 | 0 | 22,657 | 0 | 22,657 |
| Bandy | 0 | 7,293 | 0 | 79 | 0 | 0 | 0 | 7,372 |
| Upper Horsepen | 0 | 0 | 0 | 0 | 0 | 280,651 | 0 | 280,651 |
| **Norton / New River Formation total** | **831,183** | **287,367** | **0** | **545,840** | **0** | **1,193,385** | **1,055,369** | **3,913,144** |
| **Pocahontas Formation** | | | | | | | | |
| Pocahontas No. 5 | 0 | 0 | 0 | 0 | 0 | 278,444 | 0 | 278,444 |
| Pocahontas No. 3 | 6,033,054 | 0 | 0 | 0 | 0 | 0 | 0 | 6,033,054 |
| Pocahontas No. 2 | 0 | 0 | 0 | 0 | 0 | 302,986 | 0 | 302,986 |
| Pocahontas No. 1 | 0 | 0 | 0 | 0 | 0 | 156,107 | 0 | 156,107 |
| **Pocahontas Formation total** | **6,033,054** | **0** | **0** | **0** | **0** | **737,537** | **0** | **6,770,591** |
| **Total Production** | **10,084,363** | **4,284,883** | **1,151,488** | **1,301,532** | **0** | **1,930,922** | **13,500,806** | **32,253,994** |

1. The Blair coal zone is widely misidentified north of Wise County. Production from the "Blair" of Buchanan and Dickenson Counties is reported with the Dorchester coal bed.

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mines -- to reflect current geologic interpretation and stratigraphic correlations)

Table 14. Coal mine production (short tons) in Virginia by coal bed in stratigraphic order and county, 2000.

| Geologic Formation / Coal Bed / Coal Zone | County | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Buchanan | Dickenson | Lee | Russell | Scott | Tazewell | Wise | Total |
| **Harlan Formation** | | | | | | | | |
| No. 13 | 0 | 0 | 0 | 0 | 0 | 0 | 19,324 | 19,324 |
| **Harlan Formation total** | **0** | **0** | **0** | **0** | **0** | **0** | **19,324** | **19,324** |
| **Wise Formation** | | | | | | | | |
| High Splint | 0 | 0 | 0 | 0 | 0 | 0 | 24,112 | 24,112 |
| Morris | 0 | 0 | 0 | 0 | 0 | 0 | 198,916 | 198,916 |
| Pardee zone (Upper Parson, Parsons) | 0 | 0 | 0 | 0 | 0 | 0 | 735,956 | 735,956 |
| Gin Creek (No. 8) | 0 | 0 | 0 | 0 | 0 | 0 | 78,411 | 78,411 |
| Phillips (Wallins?) | 0 | 0 | 223,155 | 0 | 0 | 0 | 431,558 | 654,713 |
| Jack Rock | 0 | 0 | 0 | 0 | 0 | 0 | 97,947 | 97,947 |
| House | 0 | 0 | 0 | 0 | 0 | 0 | 119,039 | 119,039 |
| Low Splint zone (Creech, F Seam, G Seam?, I Seam?) | 0 | 0 | 27,272 | 0 | 0 | 0 | 1,722,237 | 1,749,509 |
| 34-inch (Cedar Grove, E Seam?) | 0 | 0 | 0 | 0 | 0 | 0 | 151,526 | 151,526 |
| Owl | 0 | 0 | 0 | 0 | 0 | 0 | 30,567 | 30,567 |
| Taggart (C, Darby) | 0 | 1,553 | 396,609 | 0 | 0 | 0 | 1,462,755 | 1,860,917 |
| Taggart Marker (B Seam?) | 0 | 0 | 0 | 0 | 0 | 0 | 658,066 | 658,066 |
| Wilson (Alma, Harlan, Upper Standiford) | 17,241 | 0 | 391,361 | 0 | 0 | 0 | 40,065 | 448,667 |
| Upper St. Charles (Redwine, Standiford) | 0 | 0 | 0 | 0 | 0 | 0 | 458,820 | 458,820 |
| Pinhook | 0 | 0 | 0 | 0 | 0 | 0 | 176,440 | 176,440 |
| Kelly | 72,138 | 0 | 0 | 0 | 0 | 0 | 1,139,980 | 1,212,118 |
| Imboden zone (Bolling, Imboden Rider, Lower Imboden) | 0 | 0 | 0 | 0 | 0 | 0 | 1,904,088 | 1,904,088 |
| Clintwood zone (Upper Clintwood, Lower Clintwood) | 121,536 | 152,423 | 0 | 0 | 0 | 0 | 779,239 | 1,053,198 |
| Blair zone (Blair Marker)[1] | 0 | 0 | 0 | 0 | 0 | 0 | 121,793 | 121,793 |
| Lyons (Eagle) | 715,938 | 213,792 | 0 | 0 | 0 | 0 | 94,753 | 1,024,483 |
| Dorchester ("Blair" of Buchanan and Dickenson Counties)[1] | 627,177 | 44,919 | 0 | 0 | 0 | 0 | 656,439 | 1,328,535 |
| **Wise Formation total** | **1,554,030** | **412,687** | **1,038,397** | **0** | **0** | **0** | **11,082,707** | **14,087,821** |
| **Norton Formation** | | | | | | | | |
| Norton (Glamorgan) | 77,759 | 110,368 | 0 | 0 | 0 | 0 | 1,699,521 | 1,887,648 |
| Hagy (Edwards) | 882,195 | 7,792 | 0 | | 0 | 0 | 324,116 | 1,214,103 |
| Splash Dam | 804,341 | 778,507 | 0 | 17,356 | 0 | 0 | 0 | 1,600,204 |
| Upper Banner | 0 | 1,076,834 | 0 | 360,828 | 0 | 0 | 57,343 | 1,495,005 |
| Lower Banner | 0 | 1,311,182 | 0 | 63,652 | 0 | 0 | 15,159 | 1,389,993 |
| Kennedy | 384,051 | 0 | 0 | 172,394 | 0 | 0 | 0 | 556,445 |
| **Norton Formation total** | **2,148,346** | **3,284,683** | **0** | **614,230** | **0** | **0** | **2,096,139** | **8,143,398** |
| **Norton / Lee / New River Formation** | | | | | | | | |
| Raven (Red Ash) | 81,186 | 0 | 0 | 0 | 0 | 0 | 173,342 | 254,528 |
| Jawbone | 467,806 | 232,762 | 0 | 476,815 | 0 | 0 | 1,123,721 | 2,301,104 |
| Tiller | 66,338 | 0 | 0 | 0 | 0 | 373,598 | 0 | 439,936 |
| Greasy Creek | 0 | 0 | 0 | 0 | 0 | 592,477 | 0 | 592,477 |
| Bandy | 0 | 169,315 | 0 | 0 | 0 | 0 | 0 | 169,315 |
| Upper Horsepen | 0 | 0 | 0 | 0 | 0 | 194,289 | 0 | 194,289 |
| **Norton / New River Formation total** | **615,330** | **402,077** | **0** | **476,815** | **0** | **1,160,364** | **1,297,063** | **3,951,649** |
| **Pocahontas Formation** | | | | | | | | |
| Pocahontas No. 5 | 0 | 0 | 0 | 0 | 0 | 327,418 | 0 | 327,418 |
| Pocahontas No. 3 | 6,725,982 | 0 | 0 | 0 | 0 | 0 | 0 | 6,725,982 |
| Pocahontas (stratigraphic position / correlation uncertain) | 0 | 0 | 0 | 0 | 0 | 3,988 | 0 | 3,988 |
| **Pocahontas Formation total** | **6,725,982** | **0** | **0** | **0** | **0** | **331,406** | **0** | **7,057,388** |
| **Total Production** | **11,043,688** | **4,099,447** | **1,038,397** | **1,091,045** | **0** | **1,491,770** | **14,495,233** | **33,259,580** |

1. The Blair coal zone is widely misidentified north of Wise County. Production from the "Blair" of Buchanan and Dickenson Counties is reported with the Dorchester coal bed.

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mines -- to reflect current geologic interpretation and stratigraphic correlations)

Table 15. Coal mine production (short tons) in Virginia by coal bed in stratigraphic order and county, 2001.

| Geologic Formation / Coal Bed / Coal Zone | County | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Buchanan | Dickenson | Lee | Russell | Scott | Tazewell | Wise | Total |
| **Harlan Formation** | | | | | | | | |
| No. 14 | 0 | 0 | 0 | 0 | 0 | 0 | 26,963 | 26,963 |
| No. 13 | 0 | 0 | 0 | 0 | 0 | 0 | 319,112 | 319,112 |
| **Harlan Formation total** | **0** | **0** | **0** | **0** | **0** | **0** | **346,075** | **346,075** |
| **Wise Formation** | | | | | | | | |
| High Splint | 0 | 0 | 0 | 0 | 0 | 0 | 84,295 | 84,295 |
| Morris | 0 | 0 | 0 | 0 | 0 | 0 | 278,338 | 278,338 |
| Pardee zone (Upper Parson, Parsons) | 0 | 0 | 0 | 0 | 0 | 0 | 627,185 | 627,185 |
| Wax | 0 | 0 | 0 | 0 | 0 | 0 | 12,813 | 12,813 |
| Gin Creek (No. 8) | 0 | 0 | 0 | 0 | 0 | 0 | 83,337 | 83,337 |
| Phillips | 0 | 0 | 0 | 0 | 0 | 0 | 511,158 | 511,158 |
| Little Red | 0 | 0 | 0 | 0 | 0 | 0 | 41,942 | 41,942 |
| House | 0 | 0 | 0 | 0 | 0 | 0 | 129,039 | 129,039 |
| Low Splint zone (Creech, Creech Sea?, F Seam, G Seam?) | 0 | 0 | 114,653 | 0 | 0 | 0 | 2,032,136 | 2,146,789 |
| 34-inch (Cedar Grove, E Seam?) | 0 | 0 | 0 | 0 | 0 | 0 | 158,730 | 158,730 |
| Owl | 0 | 0 | 0 | 0 | 0 | 0 | 122,871 | 122,871 |
| Taggart zone (Darby, Taggart A) | 0 | 0 | 182,822 | 0 | 0 | 0 | 1,373,645 | 1,556,467 |
| Taggart Marker (B Seam?, Kellioka) | 0 | 0 | 30,031 | 0 | 0 | 0 | 545,747 | 575,778 |
| Wilson (Alma, Harlan, Upper Standiford) | 307,510 | 0 | 411,240 | 0 | 0 | 0 | 159,258 | 878,008 |
| Upper St. Charles (Redwine, Standiford) | 0 | 0 | 0 | 0 | 0 | 0 | 800,603 | 800,603 |
| Pinhook | 0 | 0 | 0 | 0 | 0 | 0 | 293,502 | 293,502 |
| Kelly (Upper Bolling) | 0 | 0 | 29,191 | 0 | 0 | 0 | 1,255,676 | 1,284,867 |
| Imboden zone (Blue Crystal?, Campbell Creek, Pond Creek, Rider?) | 44,339 | 0 | 14,330 | 0 | 0 | 79,146 | 955,452 | 1,093,267 |
| Clintwood | 281,960 | 254,146 | 0 | 0 | 0 | 0 | 386,382 | 922,488 |
| Blair[1] | 0 | 0 | 0 | 0 | 0 | 0 | 65,498 | 65,498 |
| Lyons (Eagle) | 566,096 | 105,049 | 0 | 0 | 0 | 0 | 114,026 | 785,171 |
| Dorchester ("Blair" of Buchanan and Dickenson Counties)[1] | 932,528 | 112,397 | 0 | 0 | 0 | 0 | 368,834 | 1,413,759 |
| **Wise Formation total** | **2,132,433** | **471,592** | **782,267** | **0** | **0** | **79,146** | **10,400,467** | **13,865,905** |
| **Norton Formation** | | | | | | | | |
| Norton (Glamorgan) | 193,341 | 65,318 | 0 | 0 | 0 | 0 | 1,182,862 | 1,441,521 |
| Hagy | 693,256 | 0 | 0 | 0 | 0 | 0 | 0 | 693,256 |
| Splash Dam | 609,624 | 1,018,940 | 0 | 69,376 | 0 | 0 | 0 | 1,697,940 |
| Upper Banner | 0 | 968,553 | 0 | 114,203 | 0 | 0 | 4,605 | 1,087,361 |
| Lower Banner | 0 | 1,137,776 | 0 | 286,194 | 0 | 0 | 599,561 | 2,023,531 |
| Kennedy | 179,010 | 0 | 0 | 216,122 | 0 | 0 | 0 | 395,132 |
| **Norton Formation total** | **1,675,231** | **3,190,587** | **0** | **685,895** | **0** | **0** | **1,787,028** | **7,338,741** |
| **Norton / Lee / New River Formation** | | | | | | | | |
| Aily | 0 | 0 | 0 | 0 | 0 | 0 | 77,924 | 77,924 |
| Raven (Red Ash) | 79,862 | 0 | 0 | 0 | 0 | 0 | 382,739 | 462,601 |
| Jawbone | 435,013 | 90,866 | 0 | 552,388 | 0 | 76,447 | 748,852 | 1,903,566 |
| Tiller | 241,762 | 0 | 0 | 0 | 0 | 583,649 | 0 | 825,411 |
| Greasy Creek | 0 | 0 | 0 | 0 | 0 | 583,345 | 0 | 583,345 |
| Bandy | 0 | 15,191 | 0 | 0 | 0 | 0 | 0 | 15,191 |
| Upper Horsepen | 0 | 0 | 0 | 0 | 0 | 115,571 | 0 | 115,571 |
| **Norton / New River Formation total** | **756,637** | **106,057** | **0** | **552,388** | **0** | **1,359,012** | **1,209,515** | **3,983,609** |
| **Pocahontas Formation** | | | | | | | | |
| Pocahontas No. 3 | 6,781,822 | 0 | 0 | 0 | 0 | 0 | 0 | 6,781,822 |
| Pocahontas (stratigraphic position / correlation uncertain) | 0 | 0 | 0 | 0 | 0 | 284,412 | 0 | 284,412 |
| **Pocahontas Formation total** | **6,781,822** | **0** | **0** | **0** | **0** | **284,412** | **0** | **7,066,234** |
| **Total Production** | **11,346,123** | **3,768,236** | **782,267** | **1,238,283** | **0** | **1,722,570** | **13,743,085** | **32,600,564** |

1. The Blair coal zone is widely misidentified north of Wise County. Production from the "Blair" of Buchanan and Dickenson Counties is reported with the Dorchester coal bed.

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mines -- to reflect current geologic interpretation and stratigraphic correlations)

Table 16. Coal mine production (short tons) in Virginia by coal bed in stratigraphic order and county, 2002.

| Geologic Formation / Coal Bed / Coal Zone | County | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Buchanan | Dickenson | Lee | Russell | Scott | Tazewell | Wise | Total |
| **Harlan Formation** | | | | | | | | |
| No. 14 | 0 | 0 | 0 | 0 | 0 | 0 | 34,480 | 34,480 |
| No. 13 | 0 | 0 | 0 | 0 | 0 | 0 | 223,931 | 223,931 |
| **Harlan Formation total** | **0** | **0** | **0** | **0** | **0** | **0** | **258,411** | **258,411** |
| **Wise Formation** | | | | | | | | |
| High Splint | 0 | 0 | 0 | 0 | 0 | 0 | 271,392 | 271,392 |
| Morris | 0 | 0 | 0 | 0 | 0 | 0 | 14,959 | 14,959 |
| Pardee (Parsons) | 0 | 0 | 13,063 | 0 | 0 | 0 | 670,129 | 683,192 |
| Wax | 0 | 0 | 0 | 0 | 0 | 0 | 22,579 | 22,579 |
| Gin Creek (No. 8) | 0 | 0 | 0 | 0 | 0 | 0 | 56,855 | 56,855 |
| Phillips | 0 | 0 | 0 | 0 | 0 | 0 | 683,405 | 683,405 |
| Jack Rock | 0 | 0 | 0 | 0 | 0 | 0 | 86,413 | 86,413 |
| Little Red | 0 | 0 | 0 | 0 | 0 | 0 | 71,529 | 71,529 |
| House | 0 | 0 | 0 | 0 | 0 | 0 | 490,156 | 490,156 |
| Low Splint zone (Creech, Creech Sea?) | 0 | 0 | 79,230 | 0 | 0 | 0 | 2,056,119 | 2,135,349 |
| 34-inch (Cedar Grove) | 0 | 0 | 0 | 0 | 0 | 0 | 157,964 | 157,964 |
| Owl | 0 | 0 | 0 | 0 | 0 | 0 | 50,119 | 50,119 |
| Taggart | 0 | 0 | 180,136 | 0 | 0 | 0 | 1,643,646 | 1,823,782 |
| Taggart Marker | 0 | 0 | 0 | 0 | 0 | 0 | 366,084 | 366,084 |
| Wilson (Alma, Harlan, Upper Elkhorn?) | 373,568 | 0 | 329,892 | 0 | 0 | 0 | 218,896 | 922,356 |
| Upper St. Charles (Redwine, Standiford) | 0 | 0 | 0 | 0 | 0 | 0 | 360,468 | 360,468 |
| Pinhook | 0 | 0 | 0 | 0 | 0 | 0 | 76,119 | 76,119 |
| Kelly | 0 | 0 | 0 | 0 | 0 | 0 | 898,543 | 898,543 |
| Imboden (Bolling, Pond Creek) | 159,247 | 5,552 | 0 | 0 | 0 | 25,442 | 809,849 | 1,000,090 |
| Clintwood | 241,690 | 164,916 | 0 | 0 | 0 | 0 | 217,425 | 624,031 |
| Blair[1] | 0 | 0 | 0 | 6,769 | 0 | 0 | 97,047 | 103,816 |
| Lyons (Eagle) | 326,445 | 100,306 | 0 | 0 | 0 | 0 | 76,141 | 502,892 |
| Dorchester ("Blair" of Buchanan and Dickenson Counties) [1] | 196,502 | 52,076 | 0 | 0 | 0 | 0 | 388,193 | 636,771 |
| **Wise Formation total** | **1,297,452** | **322,850** | **602,321** | **6,769** | **0** | **25,442** | **9,784,030** | **12,038,864** |
| **Norton Formation** | | | | | | | | |
| Norton (Glamorgan) | 198,037 | 129,742 | 0 | 0 | 0 | 0 | 1,348,049 | 1,675,828 |
| Hagy | 527,160 | 0 | 0 | 64,152 | 0 | 0 | 0 | 591,312 |
| Splash Dam | 469,160 | 822,150 | 0 | 94,487 | 0 | 0 | 0 | 1,385,797 |
| Upper Banner | 505 | 766,976 | 0 | 69,217 | 0 | 0 | 0 | 836,698 |
| Lower Banner | 306,669 | 1,503,320 | 0 | 183,998 | 0 | 0 | 656,970 | 2,650,957 |
| Kennedy | 192,078 | 0 | 0 | 121,382 | 0 | 0 | 0 | 313,460 |
| **Norton Formation total** | **1,693,609** | **3,222,188** | **0** | **533,236** | **0** | **0** | **2,005,019** | **7,454,052** |
| **Norton / Lee / New River Formation** | | | | | | | | |
| Aily | 0 | 0 | 0 | 0 | 0 | 0 | 211,096 | 211,096 |
| Raven (Red Ash) | 16,165 | 0 | 0 | 0 | 0 | 0 | 1,046,643 | 1,062,808 |
| Jawbone | 299,995 | 39,986 | 0 | 436,088 | 0 | 251,604 | 1,836,444 | 2,864,117 |
| Tiller | 298,459 | 0 | 0 | 0 | 0 | 491,491 | 0 | 789,950 |
| Greasy Creek | 0 | 0 | 0 | 0 | 0 | 251,867 | 0 | 251,867 |
| Upper Horsepen | 0 | 0 | 0 | 0 | 0 | 113,415 | 0 | 113,415 |
| **Norton / New River Formation total** | **614,619** | **39,986** | **0** | **436,088** | **0** | **1,108,377** | **3,094,183** | **5,293,253** |
| **Pocahontas Formation** | | | | | | | | |
| Pocahontas No. 3 | 6,237,596 | 0 | 0 | 0 | 0 | 0 | 0 | 6,237,596 |
| Pocahontas (stratigraphic position / correlation uncertain) | 0 | 0 | 0 | 0 | 0 | 463,964 | 0 | 463,964 |
| **Pocahontas Formation total** | **6,237,596** | **0** | **0** | **0** | **0** | **463,964** | **0** | **6,701,560** |
| **Total Production** | **9,843,276** | **3,585,024** | **602,321** | **976,093** | **0** | **1,597,783** | **15,141,643** | **31,746,140** |

1. The Blair coal zone is widely misidentified north of Wise County. Production from the "Blair" of Buchanan and Dickenson Counties is reported with the Dorchester coal bed.

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mines -- to reflect current geologic interpretation and stratigraphic correlations)

Table17. Coal mine production (short tons) in Virginia by coal bed in stratigraphic order and county, 2003.

| Geologic Formation / Coal Bed / Coal Zone | County | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Buchanan | Dickenson | Lee | Russell | Scott | Tazewell | Wise | Total |
| **Harlan Formation** | | | | | | | | |
| No. 14 | 0 | 0 | 0 | 0 | 0 | 0 | 65,701 | 65,701 |
| No. 13 | 0 | 0 | 0 | 0 | 0 | 0 | 22,492 | 22,492 |
| **Harlan Formation total** | **0** | **0** | **0** | **0** | **0** | **0** | **88,193** | **88,193** |
| **Wise Formation** | | | | | | | | |
| High Splint | 0 | 0 | 0 | 0 | 0 | 0 | 1,349,188 | 1,349,188 |
| Morris | 0 | 0 | 0 | 0 | 0 | 0 | 87,552 | 87,552 |
| Pardee (Parsons) | 0 | 0 | 339,934 | 0 | 0 | 0 | 1,252,954 | 1,592,888 |
| Wax | 0 | 0 | 0 | 0 | 0 | 0 | 111,507 | 111,507 |
| Gin Creek (No. 8) | 0 | 0 | 0 | 0 | 0 | 0 | 573 | 573 |
| Phillips | 0 | 0 | 0 | 0 | 0 | 0 | 959,848 | 959,848 |
| Jack Rock | 0 | 0 | 0 | 0 | 0 | 0 | 46,470 | 46,470 |
| Little Red | 0 | 0 | 0 | 0 | 0 | 0 | 21,524 | 21,524 |
| House | 0 | 0 | 0 | 0 | 0 | 0 | 101,769 | 101,769 |
| Low Splint (Creech) | 0 | 2,257 | 11,796 | 0 | 0 | 0 | 1,115,651 | 1,129,704 |
| 34-inch (Cedar Grove) | 0 | 0 | 0 | 0 | 0 | 0 | 215,429 | 215,429 |
| Owl | 0 | 0 | 0 | 0 | 0 | 0 | 59,228 | 59,228 |
| Taggart | 0 | 0 | 205,759 | 0 | 0 | 0 | 2,297,616 | 2,503,375 |
| Wilson (Alma, Harlan) | 217,659 | 0 | 290,531 | 0 | 0 | 0 | 196,234 | 704,424 |
| Pinhook | 0 | 0 | 0 | 0 | 0 | 0 | 283,367 | 283,367 |
| Kelly (Upper Bolling) | 0 | 0 | 0 | 0 | 0 | 0 | 1,204,320 | 1,204,320 |
| Imboden (Campbell Creek) | 5,440 | 0 | 0 | 0 | 0 | 0 | 758,567 | 764,007 |
| Clintwood zone (Clintwood Marker, Lower Clintwood) | 176,482 | 88,661 | 0 | 0 | 0 | 0 | 171,381 | 436,524 |
| Blair[1] | 0 | 0 | 0 | 0 | 0 | 0 | 73,384 | 73,384 |
| Lyons (Eagle) | 863,713 | 298,080 | 0 | 0 | 0 | 0 | 33,197 | 1,194,990 |
| Dorchester ("Blair" of Buchanan and Dickenson Counties) [1] | 677,242 | 85,087 | 0 | 0 | 0 | 0 | 239,033 | 1,001,362 |
| **Wise Formation total** | **1,940,536** | **474,085** | **848,020** | **0** | **0** | **0** | **10,578,792** | **13,841,433** |
| **Norton Formation** | | | | | | | | |
| Norton (Glamorgan) | 159,097 | 26,369 | 0 | 0 | 0 | 0 | 424,774 | 610,240 |
| Hagy (Edwards) | 425,143 | 0 | 0 | 12,642 | 0 | 0 | 332,580 | 770,365 |
| Splash Dam | 809,643 | 950,934 | 0 | 27,556 | 0 | 0 | 17,706 | 1,805,839 |
| Upper Banner | 0 | 412,517 | 0 | 114,544 | 0 | 0 | 219,689 | 746,750 |
| Middle Banner | 0 | 0 | 0 | 29,612 | 0 | 0 | 0 | 29,612 |
| Lower Banner | 0 | 2,593,991 | 0 | 237,094 | 0 | 0 | 107,360 | 2,938,445 |
| Kennedy | 180,131 | 0 | 0 | 112,663 | 0 | 0 | 0 | 292,794 |
| **Norton Formation total** | **1,574,014** | **3,983,811** | **0** | **534,111** | **0** | **0** | **1,102,109** | **7,194,045** |
| **Norton / Lee / New River Formation** | | | | | | | | |
| Aily | 0 | 0 | 0 | 0 | 0 | 0 | 184,058 | 184,058 |
| Raven (Red Ash) | 0 | 0 | 0 | 0 | 0 | 0 | 492,029 | 492,029 |
| Jawbone | 172,986 | 111,045 | 0 | 345,188 | 0 | 247,396 | 1,028,775 | 1,905,390 |
| Tiller | 258,039 | 0 | 0 | 0 | 0 | 519,091 | 87,878 | 865,008 |
| Upper Horsepen | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Norton / New River Formation total** | **431,025** | **111,045** | **0** | **345,188** | **0** | **766,487** | **1,792,740** | **3,446,485** |
| **Pocahontas Formation** | | | | | | | | |
| Pocahontas No. 5 | 0 | 0 | 0 | 0 | 0 | 105,646 | 0 | 105,646 |
| Pocahontas No. 3 | 6,566,349 | 0 | 0 | 0 | 0 | 0 | 0 | 6,566,349 |
| Pocahontas (stratigraphic position / correlation uncertain) | 0 | 0 | 0 | 0 | 0 | 400,953 | 0 | 400,953 |
| **Pocahontas Formation total** | **6,566,349** | **0** | **0** | **0** | **0** | **506,599** | **0** | **7,072,948** |
| **No Geologic Formation** | | | | | | | | |
| Pond Recovery | 0 | 0 | 0 | 0 | 0 | 32,910 | 0 | 32,910 |
| Unknown (no coal bed name listed) | 0 | 0 | 0 | 0 | 0 | 0 | 6,608 | 6,608 |
| **No Geologic Formation total** | **0** | **0** | **0** | **0** | **0** | **32,910** | **6,608** | **39,518** |
| **Total Production** | **10,511,924** | **4,568,941** | **848,020** | **879,299** | **0** | **1,305,996** | **13,568,442** | **31,682,622** |

1. The Blair coal zone is widely misidentified north of Wise County. Production from the "Blair" of Buchanan and Dickenson Counties is reported with the Dorchester coal bed.

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mines -- to reflect current geologic interpretation and stratigraphic correlations)

Table 18. Top ten coal bed producers and production by geologic formation in Virginia, 1999.

| Coal Bed / Coal Zone | | Production (short tons) | Percent of Total Production |
|---|---|---|---|
| 1 | Pocahontas No. 3 | 6,033,054 | 18.7% |
| 2 | Jawbone | 2,484,565 | 7.7% |
| 3 | Imboden (Campbell Creek, Lower Bolling) | 1,902,026 | 5.9% |
| 4 | Dorchester ("Blair" of Buchanan and Dickenson Counties) | 1,759,981 | 5.5% |
| 5 | Low Splint (Creech, Creech Sea?) | 1,733,721 | 5.4% |
| 6 | Clintwood zone (Upper Clintwood, Lower Clintwood, Clintwood Marker) | 1,699,399 | 5.3% |
| 7 | Blair zone (Blair Rider, Blair Marker) | 1,518,412 | 4.7% |
| 8 | Lower Banner | 1,412,741 | 4.4% |
| 9 | Splash Dam | 1,278,268 | 4.0% |
| 10 | Upper Banner (Upper Banner 1) | 1,090,057 | 3.4% |
| | **Total of Top Ten Producers** | **20,912,224** | **64.8%** |
| | | | |
| **Production by Geologic Formation** | | | |
| | Harlan Formation (0 coal beds) | 0 | 0.0% |
| | Wise Formation (23 coal beds) | 15,647,615 | 48.5% |
| | Norton Formation (6 coal beds) | 5,922,644 | 18.4% |
| | Norton / Lee / New River Formation (7 coal beds) | 3,913,144 | 12.1% |
| | Pocahontas Formation (4 coal beds) | 6,770,591 | 21.0% |
| | **Total Production (40 coal beds)** | **32,253,994** | 100.0% |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mines)

Table 19. Top ten coal bed producers and production by geologic formation in Virginia, 2000.

| Coal Bed / Coal Zone | | Production (short tons) | Percent of Total Production |
|---|---|---|---|
| 1 | Pocahontas No. 3 | 6,725,982 | 20.2% |
| 2 | Jawbone | 2,301,104 | 6.9% |
| 3 | Imboden zone (Bolling, Imboden Rider, Lower Imboden) | 1,904,088 | 5.7% |
| 4 | Norton (Glamorgan) | 1,887,648 | 5.7% |
| 5 | Taggart (C, Darby) | 1,860,917 | 5.6% |
| 6 | Low Splint zone (Creech, F Seam, G Seam?, I Seam?) | 1,749,509 | 5.3% |
| 7 | Splash Dam | 1,600,204 | 4.8% |
| 8 | Upper Banner | 1,495,005 | 4.5% |
| 9 | Lower Banner | 1,389,993 | 4.2% |
| 10 | Dorchester ("Blair" of Buchanan and Dickenson Counties) | 1,328,535 | 4.0% |
| | **Total of Top Ten Producers** | **22,242,985** | **66.9%** |
| | | | |
| **Production by Geologic Formation** | | | |
| | Harlan Formation (1 coal bed) | 19,324 | 0.1% |
| | Wise Formation (21 coal beds) | 14,087,821 | 42.4% |
| | Norton Formation (6 coal beds) | 8,143,398 | 24.5% |
| | Norton / Lee / New River Formation (6 coal beds) | 3,951,649 | 11.9% |
| | Pocahontas Formation (3 coal beds) | 7,057,388 | 21.2% |
| | **Total Production (37 coal beds)** | **33,259,580** | **100.0%** |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mines)

Table 20. Top ten coal bed producers and production by geologic formation in Virginia, 2001.

| | Coal Bed / Coal Zone | Production (short tons) | Percent of Total Production |
|---|---|---|---|
| 1 | Pocahontas No. 3 | 6,781,822 | 20.8% |
| 2 | Low Splint zone (Creech, Creech Sea?, F Seam, G Seam?) | 2,146,789 | 6.6% |
| 3 | Lower Banner | 2,023,531 | 6.2% |
| 4 | Jawbone | 1,903,566 | 5.8% |
| 5 | Splash Dam | 1,697,940 | 5.2% |
| 6 | Taggart zone (Darby, Taggart A) | 1,556,467 | 4.8% |
| 7 | Norton (Glamorgan) | 1,441,521 | 4.4% |
| 8 | Dorchester ("Blair" of Buchanan and Dickenson Counties) | 1,413,759 | 4.3% |
| 9 | Kelly (Upper Bolling) | 1,284,867 | 3.9% |
| 10 | Imboden zone (Blue Crystal?, Campbell Creek, Pond Creek, Rider?) | 1,093,267 | 3.4% |
| | **Total of Top Ten Producers** | **21,343,529** | **65.5%** |
| | **Production by Geologic Formation** | | |
| | Harlan Formation (2 coal beds) | 346,075 | 1.1% |
| | Wise Formation (22 coal beds) | 13,865,905 | 42.5% |
| | Norton Formation (6 coal beds) | 7,338,741 | 22.5% |
| | Norton / Lee / New River Formation (7 coal beds) | 3,983,609 | 12.2% |
| | Pocahontas Formation (2 coal beds) | 7,066,234 | 21.7% |
| | **Total Production (39 coal beds)** | **32,600,564** | **100.0%** |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mines)

Table 21. Top ten coal bed producers and production by geologic formation in Virginia, 2002.

| | Coal Bed / Coal Zone | Production (short tons) | Percent of Total Production |
|---|---|---|---|
| 1 | Pocahontas No. 3 | 6,237,596 | 19.6% |
| 2 | Jawbone | 2,864,117 | 9.0% |
| 3 | Lower Banner | 2,650,957 | 8.4% |
| 4 | Low Splint zone (Creech, Creech Sea?) | 2,135,349 | 6.7% |
| 5 | Taggart | 1,823,782 | 5.7% |
| 6 | Norton (Glamorgan) | 1,675,828 | 5.3% |
| 7 | Splash Dam | 1,385,797 | 4.4% |
| 8 | Raven (Red Ash) | 1,062,808 | 3.3% |
| 9 | Imboden (Bolling, Pond Creek) | 1,000,090 | 3.2% |
| 10 | Wilson (Alma, Harlan, Upper Elkhorn?) | 922,356 | 2.9% |
| | **Total of Top Ten Producers** | **21,758,680** | **68.5%** |
| | **Production by Geologic Formation** | | |
| | Harlan Formation (2 coal beds) | 258,411 | 0.8% |
| | Wise Formation (23 coal beds) | 12,038,864 | 37.9% |
| | Norton Formation (6 coal beds) | 7,454,052 | 23.5% |
| | Norton / Lee / New River Formation (6 coal beds) | 5,293,253 | 16.7% |
| | Pocahontas Formation (2 coal beds) | 6,701,560 | 21.1% |
| | **Total Production (39 coal beds)** | **31,746,140** | **100.0%** |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mines)

Table 22. Top ten coal bed producers and production by geologic formation in Virginia, 2003.

| Coal Bed / Coal Zone | | Production (short tons) | Percent of Total Production |
|---|---|---|---|
| 1 | Pocahontas No. 3 | 6,566,349 | 20.7% |
| 2 | Lower Banner | 2,938,445 | 9.3% |
| 3 | Taggart | 2,503,375 | 7.9% |
| 4 | Jawbone | 1,905,390 | 6.0% |
| 5 | Splash Dam | 1,805,839 | 5.7% |
| 6 | Pardee (Parsons) | 1,592,888 | 5.0% |
| 7 | High Splint | 1,349,188 | 4.3% |
| 8 | Kelly (Upper Bolling) | 1,204,320 | 3.8% |
| 9 | Lyons (Eagle) | 1,194,990 | 3.8% |
| 10 | Low Splint (Creech) | 1,129,704 | 3.6% |
| | **Total of Top Ten Producers** | **22,190,488** | **70.0%** |
| | | | |
| **Production by Geologic Formation** | | | |
| | Harlan Formation (2 coal beds) | 88,193 | 0.3% |
| | Wise Formation (21 coal beds) | 13,841,433 | 43.7% |
| | Norton Formation (7 coal beds) | 7,194,045 | 22.7% |
| | Norton / Lee / New River Formation (5 coal beds) | 3,446,485 | 10.9% |
| | Pocahontas Formation (3 coal beds) | 7,072,948 | 22.3% |
| | No Geologic Formation (2 miscellaneous production sources listed) | 39,518 | 0.1% |
| | **Total Production (38 coal beds / 2 production sources)** | **31,682,622** | **100.0%** |

(source of data: modified from the Virginia Department of Mines, Minerals and Energy, Division of Mines)

Table 23. Gas and oil production by county, 1999.

| COUNTY | OPERATOR | CONV. GAS WELLS | CONV. GAS PRODUCTION* | CBM WELLS | CBM PRODUCTION* | DUAL GAS WELLS | DUAL GAS PRODUCTION* | OIL WELLS | OIL PRODUCTION* | GAS&OIL WELLS** |
|---|---|---|---|---|---|---|---|---|---|---|
| BUCHANAN | Blazer Energy Co. | 48 | 863,976 | | | | | | | |
| BUCHANAN | Cabot Oil & Gas Corp. | 10 | 148,474 | | | | | | | |
| BUCHANAN | Columbia Natural Resources | 114 | 1,372,167 | | | | | | | |
| BUCHANAN | Consol, Inc. | | | 520 | 22,981,220 | | | | | |
| BUCHANAN | Eastern American Energy | 4 | 45,323 | | | | | | | |
| BUCHANAN | Equitable Production Co. | | | 54 | 1,985,520 | 2 | 38,294 | | | |
| BUCHANAN | Island Creek Coal Co. | | | 48 | 1,076,139 | | | | | |
| BUCHANAN | Peake Energy Co. | 1 | 20,749 | | | | | | | |
| BUCHANAN | Penn Virginia Oil & Gas | 2 | 12,343 | | | | | | | |
| BUCHANAN | Pocahontas Gas Partnership | 2 | 20,532 | 479 | 13,052,015 | | | | | |
| BUCHANAN | Ratliff Gas Co. | | | 1 | 566 | | | | | |
| BUCHANAN | Virginia Gas Co. | 39 | 286,141 | 5 | 51,593 | | | | | |
| DICKENSON | Columbia Natural Resources | 41 | 792,209 | | | | | | | |
| DICKENSON | Elliott Production Co. | 2 | 18,670 | | | | | | | |
| DICKENSON | Equitable Production Co. | 358 | 6,581,607 | 373 | 9,526,242 | 5 | 139,375 | | | |
| DICKENSON | Pine Mountain Oil & Gas | 9 | 112,595 | | | | | | | |
| DICKENSON | Virginia Gas Co. | 26 | 633,793 | | | | | | | |
| LEE | Amvest Oil & Gas | 1 | 5,503 | | | | | | | |
| LEE | APACO | | | | | | | 5 | 240 | |
| LEE | Ben Hur Oil & Gas | | | | | | | 5 | 227 | |
| LEE | Evan Energy | 3 | 25,050 | | | | | 2 | 336 | |
| LEE | Pride Oil Co. | | | | | | | 1 | 1,657 | |
| RUSSELL | Equitable Production Co. | | | 33 | 611,998 | | | | | |
| RUSSELL | Pine Mountain Oil & Gas | 2 | 3,797 | | | | | | | |
| SCOTT | Equitable Production Co. | 4 | 19,852 | | | | | | | |
| TAZEWELL | CNG Producing | 2 | 6,238 | | | | | | | |
| TAZEWELL | Cabot Oil & Gas Corp. | 28 | 500,416 | | | | | | | |
| TAZEWELL | Columbia Natural Resources | 6 | 95,478 | | | | | | | |
| TAZEWELL | Dominion Appalachian Development, Inc. | 2 | 42,359 | | | | | | | |
| TAZEWELL | Exploration Partners, Inc. | 1 | 20,736 | | | | | | | |
| TAZEWELL | Pocahontas Gas Partnership | | | 71 | 928,571 | | | | | |
| TAZEWELL | R & B Petroleum | 2 | 10,708 | | | | | | | |
| WISE | Amvest Oil & Gas | 6 | 18,067 | | | | | | | |
| WISE | Dominion Appalachian Development, Inc. | 7 | 81,324 | | | | | | | |
| WISE | Equitable Production Co. | 362 | 8,759,271 | 62 | 1,114,398 | 6 | 187,202 | | 6,344 | 44 |

*Gas reported in thousands of cubic feet (Mcf); Oil reported in Barrels (Bbls).

**Gas wells that also produce oil - not included in oil well total.

Table 24. Gas and oil production by county, 2000.

| COUNTY | OPERATOR | CONV. GAS WELLS | CONV. GAS PRODUCTION* | CBM WELLS | CBM PRODUCTION* | DUAL GAS WELLS | DUAL GAS PRODUCTION* | OIL WELLS | OIL PRODUCTION* | GAS&OIL WELLS** |
|---|---|---|---|---|---|---|---|---|---|---|
| BUCHANAN | Blazer Energy Co. | 48 | 722,955 | | | | | | | |
| BUCHANAN | Cabot Oil & Gas Corp. | 10 | 95,707 | | | | | | | |
| BUCHANAN | Columbia Natural Resources | 133 | 1,482,185 | | | | | | | |
| BUCHANAN | Consol, Inc. | | | 640 | 24,679,867 | | | | | |
| BUCHANAN | Eastern American Energy | 4 | 42,557 | | | | | | | |
| BUCHANAN | Equitable Production Co. | | | 65 | 1,753,608 | 1 | 27,373 | | | |
| BUCHANAN | Island Creek Coal Co. | | | 49 | 982,306 | | | | | |
| BUCHANAN | Peake Energy Co. | 1 | 21,264 | | | | | | | |
| BUCHANAN | Penn Virginia Oil & Gas | 2 | 13,369 | | | | | | | |
| BUCHANAN | Pocahontas Gas Partnership | 2 | 16,712 | 568 | 14,245,728 | | | | | |
| BUCHANAN | Ratliff Gas Co. | | | 1 | 395 | | | | | |
| BUCHANAN | Virginia Gas Co. | 39 | 256,397 | 5 | 43,634 | | | | | |
| DICKENSON | Columbia Natural Resources | 44 | 761,277 | | | | | | | |
| DICKENSON | Elliott Production Co. | 2 | 14,408 | | | | | | | |
| DICKENSON | Equitable Production Co. | 361 | 5,026,345 | 411 | 8,298,209 | 5 | 109,601 | | | |
| DICKENSON | Pine Mountain Oil & Gas | 8 | 105,681 | | | | | | | |
| DICKENSON | Virginia Gas Co. | 25 | 544,014 | | | | | | | |
| LEE | Amvest Oil & Gas | | 1,575 | | | | | | 60 | |
| LEE | APACO | | | | | | | 5 | 362 | |
| LEE | Ben Hur Oil & Gas | | | | | | | | 111 | |
| LEE | Evan Energy | 4 | 100,747 | | | | | 4 | 1,173 | |
| LEE | Pride Oil Co. | | | | | | | 1 | 1,310 | |
| LEE | United Well Service | | | | | | | | 2,783 | |
| RUSSELL | Equitable Production Co. | 1 | 82 | 35 | 462,508 | | | | | |
| RUSSELL | Pine Mountain Oil & Gas | 2 | 6,728 | | | | | | | |
| RUSSELL | Pocahontas Gas Partnership | | | 10 | 21,979 | | | | | |
| SCOTT | Equitable Production Co. | 3 | 17,604 | | | | | | | |
| TAZEWELL | CNG Producing | | 1,276 | | | | | | | |
| TAZEWELL | Cabot Oil & Gas Corp. | 29 | 463,422 | | | | | | | |
| TAZEWELL | Columbia Natural Resources | 6 | 76,511 | | | | | | | |
| TAZEWELL | Dominion Appalachian Development, Inc. | 2 | 40,703 | | | | | | | |
| TAZEWELL | Exploration Partners, Inc. | 1 | 18,785 | | | | | | | |
| TAZEWELL | Pocahontas Gas Partnership | | | 72 | 1,291,107 | | | | | |
| TAZEWELL | R & B Petroleum | 2 | 20,767 | | | | | | | |
| WISE | Amvest Oil & Gas | 5 | 11,307 | | | | | | | |
| WISE | Dominion Appalachian Development, Inc. | 8 | 120,617 | | | | | | | |
| WISE | Equitable Production Co. | 382 | 8,386,773 | 66 | 1,091,266 | 6 | 167,985 | | 6,619 | 44 |

*Gas reported in thousands of cubic feet (Mcf); Oil reported in Barrels (Bbls).

**Gas wells that also produce oil - not included in oil well total.

Table 25. Gas and oil production by county, 2001.

| COUNTY | OPERATOR | CONV. GAS WELLS | CONV. GAS PRODUCTION* | CBM WELLS | CBM PRODUCTION* | DUAL GAS WELLS | DUAL GAS PRODUCTION* | OIL WELLS | OIL PRODUCTION* | GAS&OIL WELLS** |
|---|---|---|---|---|---|---|---|---|---|---|
| BUCHANAN | Blazer Energy Co. | 48 | 692,053 | | | | | | | |
| BUCHANAN | Cabot Oil & Gas Corp. | 10 | 84,006 | | | | | | | |
| BUCHANAN | Columbia Natural Resources | 131 | 1,828,113 | | | | | | | |
| BUCHANAN | Consol, Inc. | | | 936 | 23,014,544 | | | | | |
| BUCHANAN | Eastern American Energy | 4 | 35,561 | | | | | | | |
| BUCHANAN | Equitable Production Co. | | | 71 | 1,667,504 | 2 | 26,278 | | | |
| BUCHANAN | Island Creek Coal Co. | | | 47 | 675,523 | | | | | |
| BUCHANAN | Peake Energy Co. | 1 | 20,704 | | | | | | | |
| BUCHANAN | Penn Virginia Oil & Gas | 2 | 11,779 | | | | | | | |
| BUCHANAN | Pocahontas Gas Partnership | 2 | 14,170 | 636 | 16,111,683 | | | | | |
| BUCHANAN | Ratliff Gas Co. | | | 1 | 462 | | | | | |
| BUCHANAN | Virginia Gas Co. | 39 | 253,102 | 5 | 44,107 | | | | | |
| DICKENSON | Columbia Natural Resources | 45 | 734,380 | | | | | | | |
| DICKENSON | Elliott Production Co. | 2 | 17,197 | | | | | | | |
| DICKENSON | Equitable Production Co. | 362 | 4,850,442 | 444 | 8,540,781 | 5 | 102,404 | | | |
| DICKENSON | Pine Mountain Oil & Gas | 9 | 113,529 | | | | | | | |
| DICKENSON | Virginia Gas Co. | 26 | 518,502 | | | | | | | |
| LEE | APACO | | | | | | | 5 | 402 | |
| LEE | Evan Energy | 13 | 123,442 | | | | | 3 | 1,599 | |
| LEE | Pride Oil Co. | | | | | | | 1 | 735 | |
| LEE | United Well Service | | | | | | | 5 | 4,167 | |
| RUSSELL | Equitable Production Co. | 1 | 5,591 | 36 | 484,678 | | | | | |
| RUSSELL | Pine Mountain Oil & Gas | 2 | 8,088 | | | | | | | |
| RUSSELL | Pocahontas Gas Partnership | | | 30 | 1,576,817 | | | | | |
| SCOTT | Equitable Production Co. | 6 | 44,910 | | | | | | | |
| TAZEWELL | Cabot Oil & Gas Corp. | 29 | 425,821 | | | | | | | |
| TAZEWELL | Columbia Natural Resources | 6 | 71,029 | | | | | | | |
| TAZEWELL | Dominion Appalachian Development, Inc. | 2 | 40,274 | | | | | | | |
| TAZEWELL | Exploration Partners, Inc. | 1 | 16,774 | | | | | | | |
| TAZEWELL | Pocahontas Gas Partnership | | | 85 | 1,269,621 | | | | | |
| TAZEWELL | R & B Petroleum | 2 | 22,639 | | | | | | | |
| WISE | Amvest Oil & Gas | 6 | 10,575 | | | | | | | |
| WISE | Dominion Appalachian Development, Inc. | 8 | 90,738 | | | | | | | |
| WISE | Equitable Production Co. | 392 | 6,869,670 | 67 | 978,469 | 7 | 146,857 | | 4,441 | 38 |

*Gas reported in thousands of cubic feet (Mcf); Oil reported in Barrels (Bbls).

**Gas wells that also produce oil - not included in oil well total.

Table 26. Gas and oil production by county, 2002.

| COUNTY | OPERATOR | CONV. GAS WELLS | CONV. GAS PRODUCTION* | CBM WELLS | CBM PRODUCTION* | DUAL GAS WELLS | DUAL GAS PRODUCTION* | OIL WELLS | OIL PRODUCTION* | GAS&OIL WELLS** |
|---|---|---|---|---|---|---|---|---|---|---|
| BUCHANAN | Cabot Oil & Gas Corp. | 10 | 82,399 | | | | | | | |
| BUCHANAN | Columbia Natural Resources | 143 | 2,029,113 | | | | | | | |
| BUCHANAN | Consol, Inc. | | | 749 | 21,784,330 | | | | | |
| BUCHANAN | Eastern American Energy | 6 | 43,022 | | | | | | | |
| BUCHANAN | Equitable Production Co. | 47 | 707,400 | 72 | 1,732,946 | 2 | 29,952 | | | |
| BUCHANAN | Island Creek Coal Co. | | | 42 | 488,128 | | | | | |
| BUCHANAN | Peake Energy Co. | 1 | 21,540 | | | | | | | |
| BUCHANAN | Penn Virginia Oil & Gas | 0 | 10,879 | | | | | | | |
| BUCHANAN | Pocahontas Gas Partnership | 2 | 10,603 | 621 | 18,131,341 | | | | | |
| BUCHANAN | Ratliff Gas Co. | | | 1 | 422 | | | | | |
| BUCHANAN | Virginia Gas Co. | 39 | 248,996 | 5 | 68,339 | | | | | |
| DICKENSON | Columbia Natural Resources | 45 | 724,768 | | | | | | | |
| DICKENSON | Elliott Production Co. | 2 | 18,634 | | | | | | | |
| DICKENSON | Equitable Production Co. | 360 | 5,222,060 | 469 | 9,821,619 | 5 | 109,203 | | | |
| DICKENSON | Pine Mountain Oil & Gas | 9 | 88,766 | | | | | | | |
| DICKENSON | Virginia Gas Co. | 26 | 495,186 | | | | | | | |
| LEE | APACO | | | | | | | 5 | 429 | |
| LEE | Equitable Production Co. | 1 | 8,533 | | | | | | | |
| LEE | Evan Energy | 23 | 476,386 | | | | | | 15,606 | 8 |
| LEE | Pride Oil Co. | | | | | | | 1 | 1,287 | |
| LEE | United Well Service | | | | | | | 5 | 1,712 | |
| RUSSELL | Equitable Production Co. | 1 | 6,744 | 38 | 537,948 | | | | | |
| RUSSELL | Pine Mountain Oil & Gas | 2 | 7,520 | | | | | | | |
| RUSSELL | Pocahontas Gas Partnership | | | 72 | 2,948,299 | | | | | |
| SCOTT | Equitable Production Co. | 7 | 96,873 | | | | | | | |
| TAZEWELL | Cabot Oil & Gas Corp. | 29 | 384,032 | | | | | | | |
| TAZEWELL | Columbia Natural Resources | 6 | 55,790 | | | | | | | |
| TAZEWELL | Dominion Appalachian Development, Inc. | 2 | 34,102 | | | | | | | |
| TAZEWELL | Exploration Partners, Inc. | 1 | 14,943 | | | | | | | |
| TAZEWELL | Pocahontas Gas Partnership | 1 | 424 | 93 | 2,058,106 | | | | | |
| TAZEWELL | R & B Petroleum | 2 | 16,486 | | | | | | | |
| WISE | Amvest Oil & Gas | 6 | 9,152 | | | | | | | |
| WISE | Dominion Appalachian Development, Inc. | 8 | 82,590 | | | | | | | |
| WISE | Equitable Production Co. | 399 | 7,112,409 | 71 | 1,007,861 | 7 | 165,179 | | 6,076 | 3 |
| WISE | Paramont | 2 | 16,440 | | | | | | | |
| WISE | Penn Virginia Oil & Gas | | | 2 | 5,072 | | | | | |

*Gas reported in thousands of cubic feet (Mcf); Oil reported in Barrels (Bbls).

**Gas wells that also produce oil - not included in oil well total.

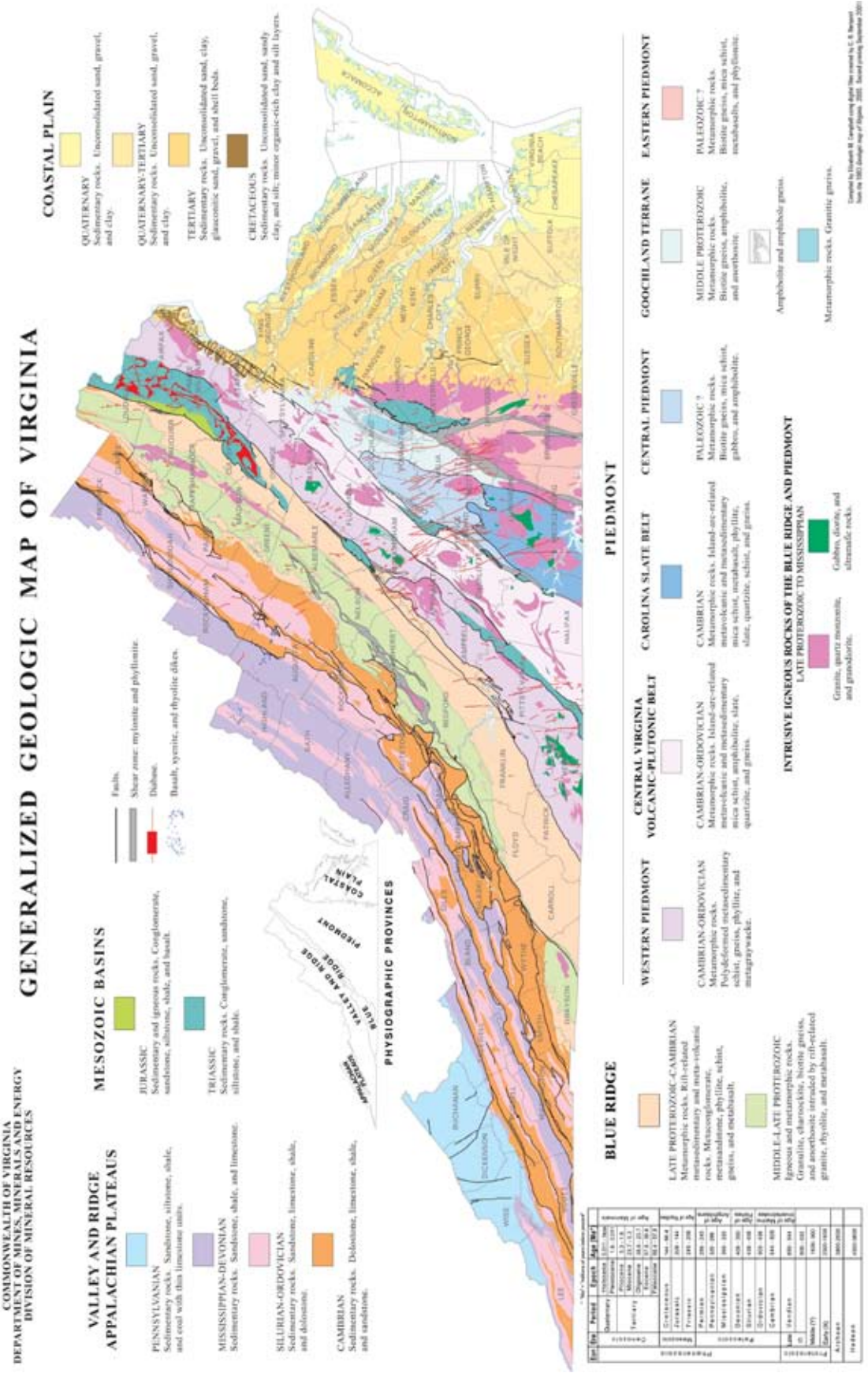
Table 27. Gas and oil production by county, 2003.

| COUNTY | OPERATOR | CONV. GAS WELLS | CONV. GAS PRODUCTION* | CBM WELLS | CBM PRODUCTION* | DUAL GAS WELLS | DUAL GAS PRODUCTION* | OIL WELLS | OIL PRODUCTION* | GAS&OIL WELLS** |
|---|---|---|---|---|---|---|---|---|---|---|
| BUCHANAN | Appalachian Energy | 35 | 228,517 | 3 | 92,012 | | | | | |
| BUCHANAN | Cabot Oil & Gas Corp. | 10 | 76,109 | | | | | | | |
| BUCHANAN | Consol Energy | 3 | 17,530 | 1239 | 43,073,066 | | | | | |
| BUCHANAN | Columbia Natural Resources | 155 | 3,186,182 | | | | | | | |
| BUCHANAN | Eastern American Energy | 6 | 42,664 | | | | | | | |
| BUCHANAN | Equitable Production Co. | 46 | 626,531 | 89 | 1,691,829 | 2 | 26,587 | | | |
| BUCHANAN | Island Creek Coal Co. | | | 22 | 398,872 | | | | | |
| BUCHANAN | Peake Energy Co. | 1 | 27,026 | | | | | | | |
| BUCHANAN | Ratliff Gas Co. | | | 1 | 96 | | | | | |
| DICKENSON | Appalachian Energy | 26 | 382,186 | | | | | | | |
| DICKENSON | Columbia Natural Resources | 47 | 666,788 | | | | | | | |
| DICKENSON | Elliott Production Co. | 2 | 16,914 | | | | | | | |
| DICKENSON | Equitable Production Co. | 374 | 5,073,696 | 507 | 9,402,443 | 5 | 92,710 | | | |
| DICKENSON | Pine Mountain Oil & Gas | 8 | 99,790 | | | | | | | |
| LEE | APACO | | | | | | | 1 | 32 | |
| LEE | Equitable Production Co. | 5 | 86,415 | | | | | | 256 | 1 |
| LEE | Evan Energy | 25 | 317,799 | | | | | 1 | 10,318 | 25 |
| LEE | Pride Oil Co. | | | | | | | 1 | 1,218 | |
| LEE | United Well Service | | | | | | | 4 | 875 | |
| RUSSELL | Consol Energy | | | 125 | 4,284,432 | | | | | |
| RUSSELL | Equitable Production Co. | 2 | 10,468 | 43 | 578,529 | | | | | |
| RUSSELL | Pine Mountain Oil & Gas | 1 | 3,342 | 72 | | | | | | |
| SCOTT | Equitable Production Co. | 9 | 100,268 | | | | | | | |
| TAZEWELL | Consol Energy | 1 | 15,112 | 96 | 2,038,892 | | | | | |
| TAZEWELL | Cabot Oil & Gas Corp. | 28 | 309,264 | | | | | | | |
| TAZEWELL | Columbia Natural Resources | 6 | 51,706 | | | | | | | |
| TAZEWELL | Dominion Appalachian Development, Inc. | 2 | 41,723 | | | | | | | |
| TAZEWELL | Exploration Partners, Inc. | 1 | 13,066 | | | | | | | |
| TAZEWELL | R & B Petroleum | 2 | 15,536 | | | | | | | |
| WISE | Amvest Oil & Gas | 5 | 11,068 | | | | | | | |
| WISE | Dominion Appalachian Development, Inc. | 8 | 71,183 | | | | | | | |
| WISE | Equitable Production Co. | 415 | 6,712,032 | 68 | 996,059 | 7 | 171,016 | | 5,790 | 32 |
| WISE | Paramont | 2 | 34,192 | | | | | | | |
| WISE | Penn Virginia Oil & Gas | | | 2 | 2,246 | | | | | |

*Gas reported in thousands of cubic feet (Mcf); Oil reported in Barrels (Bbls).

**Gas wells that also produce oil - not included in oil well total.

Appendix II. Geologic map of Virginia



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